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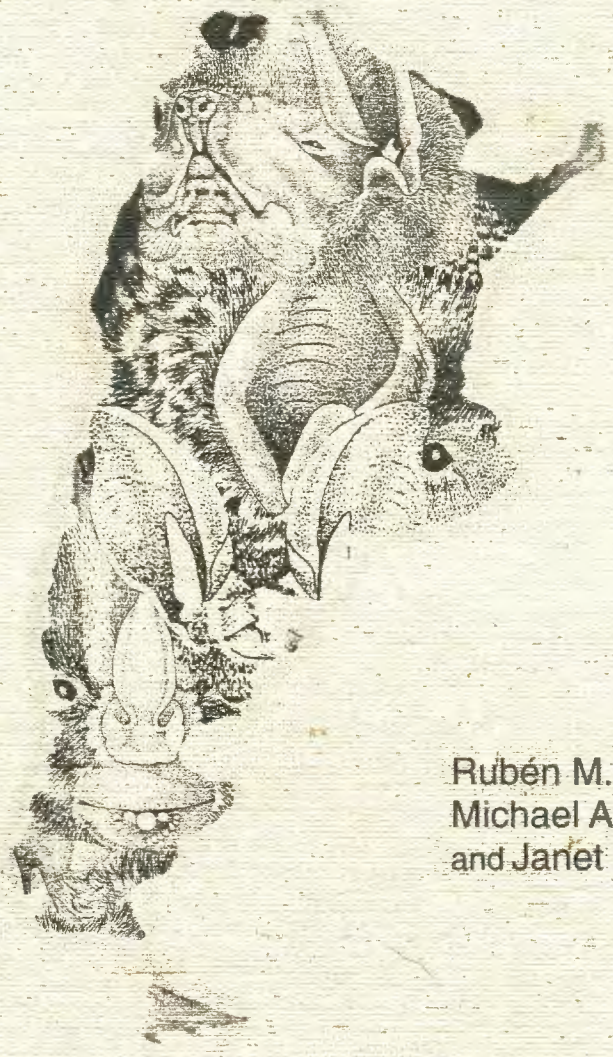
THE BATS OF ARGENTINA



Rubén M. Barquez
Michael A. Mares
and Janet K. Braun

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THE BATS OF ARGENTINA

RUBÉN M. BARQUEZ, MICHAEL A. MARES,
AND JANET K. BRAUN

Layout and Design: Janet K. Braun
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We dedicate this publication with great respect and affection to

DR. KARL F. KOOPMAN,

whose death leaves a void in the field of mammalogy in general,

and in the biology of bats in particular.

His intellect provided a shining light on the systematics of bats

that illuminated the way for a generation of investigators.

He will be greatly missed.

For now, there are no more questions.

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INTRODUCTION

Bats (Order Chiroptera) are both abundant and rich in species throughout the world. The order is, after rodents, the most speciose, with 17 families, 177 genera, and 925 species (Koopman, 1993). Nine families occur in the Neotropics, with the greatest diversity of species being found in the Amazon basin (Findley, 1993). Species richness decreases toward the poles, thus only four families are found in Argentina.

The bats of South America are biogeographically interesting. Koopman (1976, 1982) recognized seven faunistic subregions based on bat distributions, three of which occur in Argentina. The Patagonian Subregion, the largest, extends over much of the country. The Eastern Brazilian Highlands and Coast Subregion is found in northeastern Argentina in Misiones and Corrientes provinces. The Amazon Basin Subregion is found in northwestern Argentina as a strip of subtropical forest extending as far south as Catamarca Province (Mares et al., 1995, 1996, 1997; Ojeda and Mares, 1989). When Koopman's (1976, 1982) faunistic zones in Argentina are compared with the phytogeographic provinces proposed by Cabrera (1976) and Cabrera and Willink (1973), some differences are evident. The Patagonian Subregion, which does not coincide well with the floral zones, includes parts of the Chacoan, Andean-Patagonian, and Subantarctic phytogeographic provinces. However, the Eastern Brazilian Highlands and Coast Subregion and the Amazon Basin Subregion correspond to the Paranean (eastern Argentina) and the Yungas (western Argentina) phytogeographic provinces, respectively. These two small fragments of tropical and subtropical forest support the largest number of bat species in Argentina (Barquez et al., 1993; Mares et al., 1995, 1996, 1997; Ojeda and Mares, 1989).

Viewed from a continental perspective, the Yungas forest of Argentina, which is a part of Koopman's (1982) Amazon Basin Subregion, contains only 26% of the total bat species found in the entire Amazon Basin Subregion. The Paranean phytogeographic province of Argentina (which is a part of Koopman's Eastern Brazilian Highlands and Coast Subregion) contains only 42% of the bat species found in the entire Eastern Brazilian Highlands and Coast Subregion. Although these two phytogeographic provinces are rich in species elsewhere, they are relatively impoverished in Argentina, a fact that may have led bat researchers to concentrate their efforts in more speciose parts of South America. However, Argentina supports about 300 species of mammals (more than the United States), and bats are a significant component of the fauna (Burt and Grossenheider, 1976; Olrog and Lucero, 1981). To clarify the biogeography of Argentina's mammal fauna, it is necessary to understand the systematics and distribution of its bats.

There have been few detailed systematic studies on mammals in Latin America (e.g., Baker, 1991; Hershkovitz, 1987; Mares, 1982; Pine, 1982). However, early naturalists, such as G. E. Dobson, J. E. Gray, W. E. Leach, G. S. Miller, W. Peters, and O. Thomas, among others, made outstanding contributions to our knowledge of bats. Unfortunately, few studies were conducted in Argentina, although Cabrera (1958, 1961) provided a foundation for later research on all South American mammals. The paucity of systematic studies on Argentine bats likely has had a negative affect on our understanding of South American biogeography. Argentina is a country of great geological, botanical, and zoological complexity. Many species of bats reach their southern limits there. Lack of knowledge of bat systematics and distribution can lead to biogeographic conclusions being based on incomplete or erroneous information, for bats have been shown to be an especially important taxon for delineating biogeographic patterns (Findley, 1993; Ojeda and Mares, 1989; Willig and Mares, 1989; Willig and Moulton, 1989; Willig and Sandlin, 1991; Willig and Selcer, 1989). Moreover, since detailed information on the country's bats has not been available (but see Barquez et al.,1993, for a non-technical presentation of recent data on Argentine bats), most species are known from only a few specimens collected in a few localities (Barquez, 1988; Barquez and Lougheed, 1990; Barquez and Ojeda, 1992; Mares et al., 1995). Specimens frequently have been misidentified, and the few published descriptions available are based mainly on specimens from other areas. Thus it has been difficult to interpret ecological and biogeographical patterns.

In this report, we present a systematic overview of the bats of Argentina. We describe the distribution for each species, list specimens examined, provide taxonomic keys, and describe morphological features of each species to assist in identification. We also summarize available information on the biology of each species and, whenever possible, provide correct identifications for specimens cited in the literature.

MATERIALS AND METHODS

This study began in 1971 when Mares arrived in Argentina and began collecting throughout the northwestern provinces (Mares, 1973). Barquez began his work on bats in 1972, and Braun began visiting Argentina in 1990. Since the early 1970s, field trips have occurred in most years. Barquez and his students have collected bats regularly, especially in northwestern Argentina, since he became a professor at the Universidad Nacional de Tucumán in 1978. We personally have sampled 315 of the 848 localities given in Appendix I, with most field work occurring in northwestern Argentina in the forests of the Amazon Basin Subregion, an area that is not only rich in bat species, but in other mammals as well (Barquez et al., 1993; Mares et al., 1995, 1996, 1997; Ojeda and Mares, 1989). Museum specimens (3,730) also were examined at the British Museum (Natural History), London, and in North and South American collections, and loans of specimens were obtained from various museums. Several private collections were examined. A literature review provided information on previously published records.

COLLECTION AND PREPARATION OF SPECIMENS

Most specimens were captured with mist nets of different sizes, wefts, and fabric thicknesses placed in different types of vegetation, generally along rivers or streams that often are used by bats when feeding or drinking. Occasionally several nets were joined to increase the area sampled, or were placed at various heights to obtain samples from different vegetation levels. Bats also were collected from roosts in rural dwellings, hollow trees, rock fissures, culverts, and bridges.

Several hundred individuals were marked with aluminum bands on the forearm and released, their reproductive condition and weight was recorded, and ectoparasites were collected. Other individuals were prepared for museum collections as skin and skull, or preserved in 70% alcohol for anatomical study. For each specimen the following data were recorded: sex, reproductive condition, collector number, locality, external measurements (in mm), weight (in g), and date of capture. Additional observations included coexistence with other species, height above the ground at which the bats were captured, habitat, molt, ambient temperature and humidity, wind, and time of capture.

MEASUREMENTS

External measurements and characteristics (Figs. 1 and 2) were recorded in the field when specimens were prepared, or copied from labels of museum specimens. Cranial measurements (Fig. 3) were taken with vernier calipers to the nearest 0.05 mm. Measurements and their abbreviations are as follows: total length (ToL), distance from the tip of the snout to the tip of the tail; tail length (TL), distance between the point of insertion of the tail into the body and the last caudal vertebra; hindfoot length (HFL), distance from the heel to the tip of the longest digit including the claw; ear length (EL), distance between the notch and the tip of the pinna; forearm length (FA), distance between the elbow and the wrist when the wing is folded; weight, body weight in grams; condylobasal length (CBL), distance from the anteriormost edge of the premaxilla to the posteriormost projection of the occipital condyles; least interorbital breadth (LIB), least distance between the orbits; zygomatic breadth (ZB), greatest distance across the outer margins of the zygomatic arches; greatest length of skull (GLS), distance from the anteriormost point of the rostrum, excluding the incisors, to the posteriormost point of the cranium; postorbital constriction (PC), least distance across the cranium measured posterior to the postorbital processes; breadth of braincase (BB), width of the cranium measured just posterior to the zygomatic arches; length of maxillary toothrow (LMxT), distance from the anterior margin of the alveolus of the canine to the posterior margin of the alveolus of the last molar; palatal length (PL), distance from the posterior margin of the alveolus of the incisors to the caudal spine or median posterior border of the palate; mastoidal breadth (MB), width of the cranium including the mastoid processes; length of mandibular toothrow (LMdT), distance from the anterior margin of the alveolus of the canine to the posterior margin of the alveolus of the last molar; length of mandible (LM), distance from the anteriormost point (excluding the incisors) to the posteriormost point of the mandible (either the angular process or the mandibular condyle); width across canines (C-C), distance between the outer margins of the upper canines; width across molars (M-M), breadth across the upper second molars.

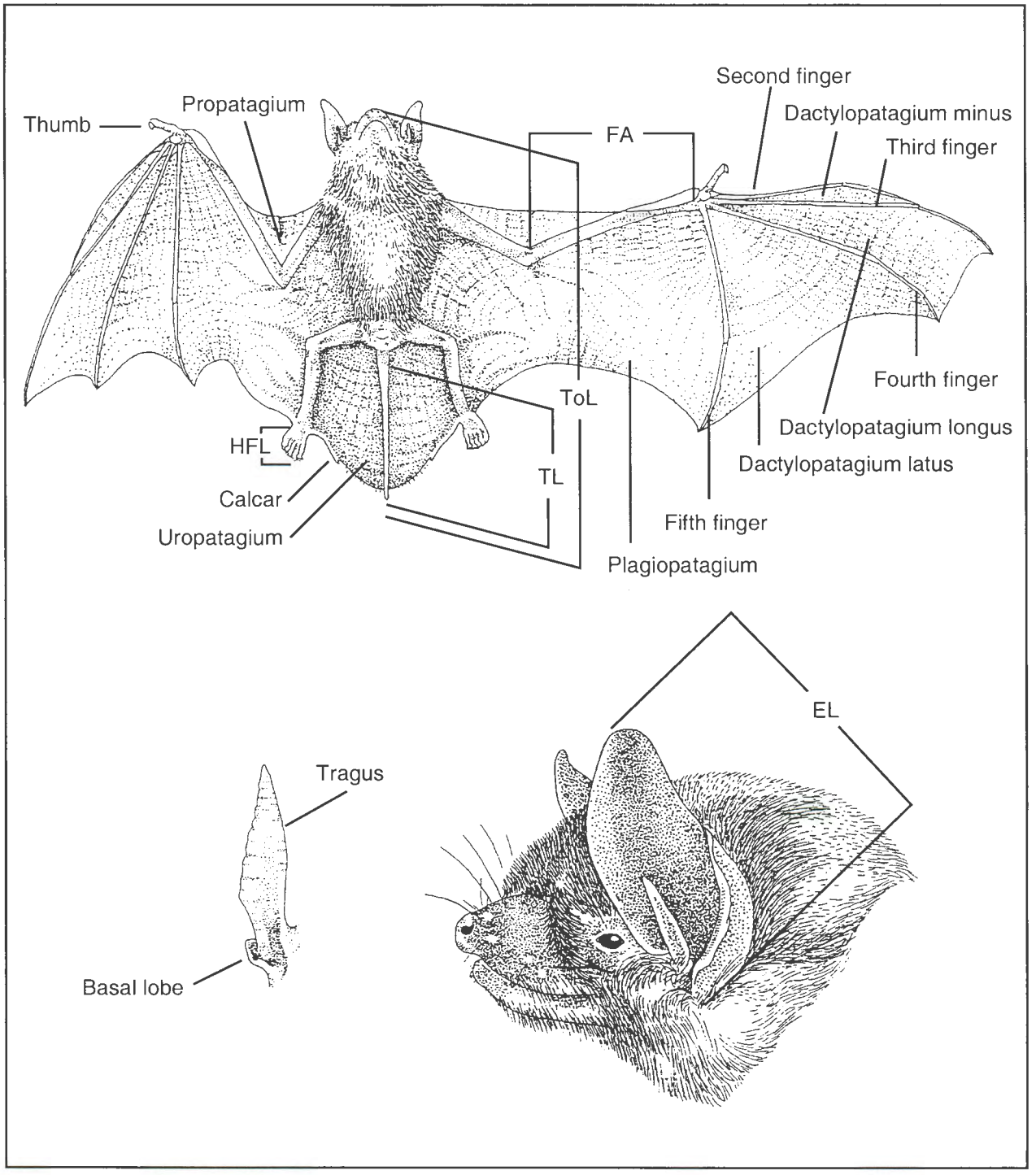


Figure 1. External measurements and terminology of external parts mentioned in the descriptions. Abbreviations: FA, forearm; ToL, total length; TL, tail length; HFL, length of the hind foot; and EL, ear length.

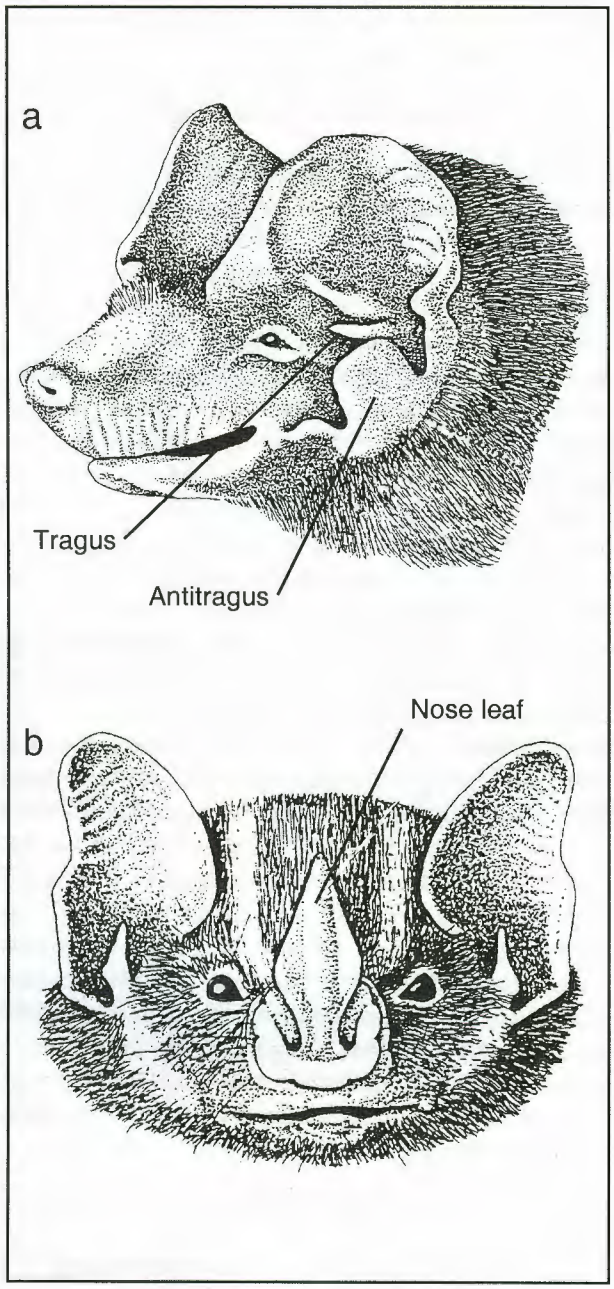


Figure 2. Location of the: (a) tragus and antitragus in molossids and (b) the nose leaf in phyllostomids.

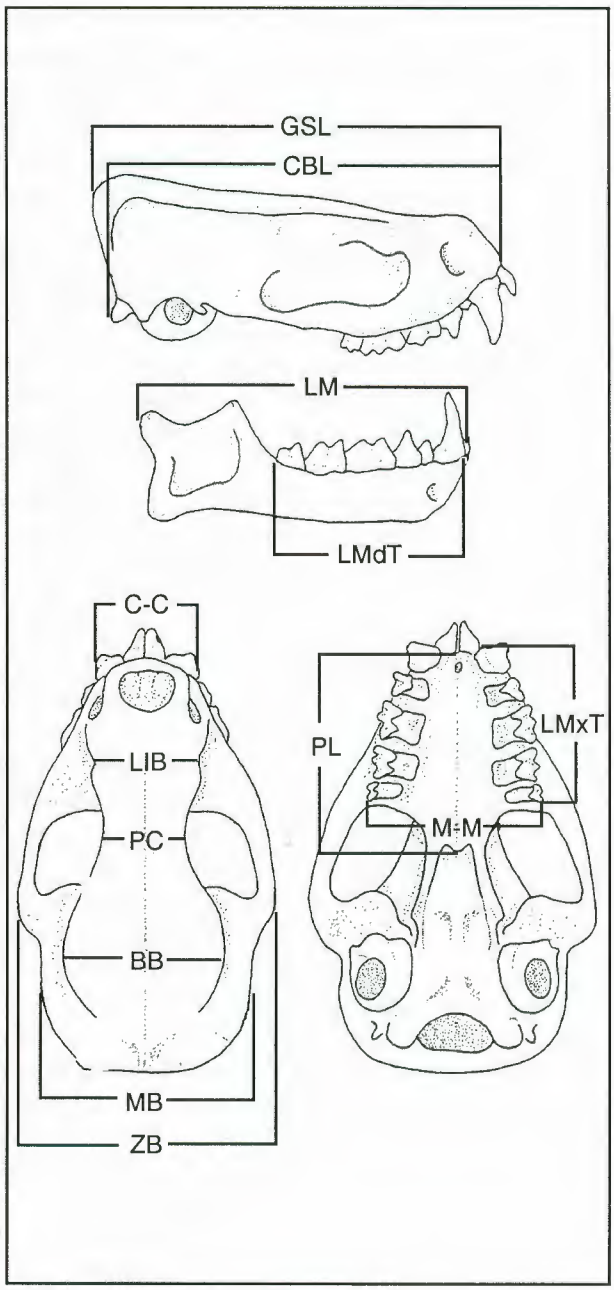


Figure 3. Cranial measurements as described in the Materials and Methods.

SPECIMENS EXAMINED

Acronyms for the museums and institutions from which specimens were obtained follows Hafner et al. (1997) for collections in the Western Hemisphere and Genoways and Schlitter (1981) for all others; for private collections, acronyms are the owner's initials: AA, collection of Analía Autino, Tucumán, Argentina; AMNH, American Museum of Natural History, New York, New York, United States; BMNH, British Museum (Natural History), London, England; CEM, collection of Elio Massoia and family, Buenos Aires, Argentina; CM, Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, United States; CML,

Colección de Mamíferos Lillo, Facultad de Ciencias Naturales e Instituto Miguel Lillo, Tucumán, Argentina; EBD, Estación Biológica Doñana, Seville, Spain; EJ, collection of Enrique Justo, La Pampa, Argentina; FCM, Colección Mamíferos, Facultad de Ciencias Exactas y Naturales, Universidad Nacional de Buenos Aires, Buenos Aires, Argentina; FMNH, The Field Museum, Chicago, Illinois, United States; IADIZA-CM, Instituto Argentino de Investigaciónes de las Zonas Aridas, Mendoza, Argentina; JRC, collection of Julio R. Contreras, CAPRIM, Corrientes, Argentina; KU, University of Kansas, Museum of Natural History, Lawrence, Kansas, United States; MACN, Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," Buenos Aires, Argentina; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, United States; MD, collection of Mónica Díaz, Tucumán, Argentina; MFA, Museo Florentino Ameghino, Santa Fe, Argentina; MLP, Colección de Mamíferos, Museo de La Plata, La Plata, Argentina; MJCM, Museo de Ciencias Naturales y Antropológicas "Prof. Juan C. Moyano," Mendoza, Argentina; MPB, collection of María P. Bertolini, Buenos Aires, Argentina; MSB, Museum of Southwestern Biology, University of New Mexico, Albuquerque, New Mexico, United States; MSU, Michigan State University Museum, East Lansing, Michigan, United States; MVZ, Museum of Vertebrate Zoology, University of California, Berkeley, California, United States; OMNH, Oklahoma Museum of Natural History, University of Oklahoma, Norman, Oklahoma, United States; PIDBA, Programa de Investigaciones de Biodiversidad Argentina, Facultad de Ciencias Naturales, Tucumán, Argentina; RAO, collection of Ricardo A. Ojeda, IADIZA, Mendoza, Argentina; RMB, collection of Ruben M. Barquez, Tucumán, Argentina; ROM, Royal Ontario Museum, Toronto, Canada; SIG, collection of Silvia I. Guerrero, Fundación Miguel Lillo, Tucumán, Argentina; SUVM, Vertebrate Museum, Shippensburg University, Shippensburg, Pennsylvania, United States; TCWC, Texas Cooperative Wildlife Collection, Texas A & M University, College Station, Texas, United States; TTU, Museum of Texas Tech University, Lubbock, Texas, United States; IBUNAM, Universidad Nacional Autónoma de México, Instituto de Biología, México, Distrito Federal, México; CUNRC, Universidad Nacional de Río Cuarto, Colección de Mamíferos, Córdoba, Argentina; USNM, United States National Museum of Natural History, Washington, District of Columbia, United States.

LOCALITIES AND MAPS

All localities listed in Appendix I were ordered alphabetically and numbered consecutively. Note that entries beginning with "ch" follow entries beginning with "c," in the Spanish style. Maps show the distribution of the numbered collecting localities for each species. In general, each locality is given as it appeared on the label. Province, department, and geographic coordinates are listed; these are based on Keegan and Keegan (1993), Anonymous (1968), and regional maps obtained from the Instituto Geográfico Militar de Argentina (Anon., 1954, 1972). Localities not found in these references or in maps available to us appear in Appendix I as "not located." Localities obtained from museum specimens or from the literature often had insufficient information concerning the political department in which the bats were collected; these were assigned to an appropriate department, taking into account that many departments have changed their boundaries and even their names over the last 100 years. We have listed the original department where a specimen was collected if this was reported by the collector. We also list the current department for all specimens, even if their department of collection was not recorded originally. The provinces of Argentina are shown in Figure 4. Records of occurrence are shown on the maps by dots. Because some localities were in close proximity, or were given in slightly different form, a single dot may indicate more than one locality. In such cases, individual localities can be obtained by examining the Specimens Examined, Additional Records, and Appendix I.

FIGURES

Drawings of each species were made using live bats as models or, in most cases, from fluid-preserved specimens. Some species are represented poorly in collections and drawings could not be made for these. For a few species, drawings were made using museum skins, photographs of live animals, and literature descriptions. Photographs of lateral, dorsal, and ventral views of the skull, and of the upper toothrow, were taken from Argentine specimens in most cases. For those species not photographed, a drawing of their most important characters was made with a camera lucida.

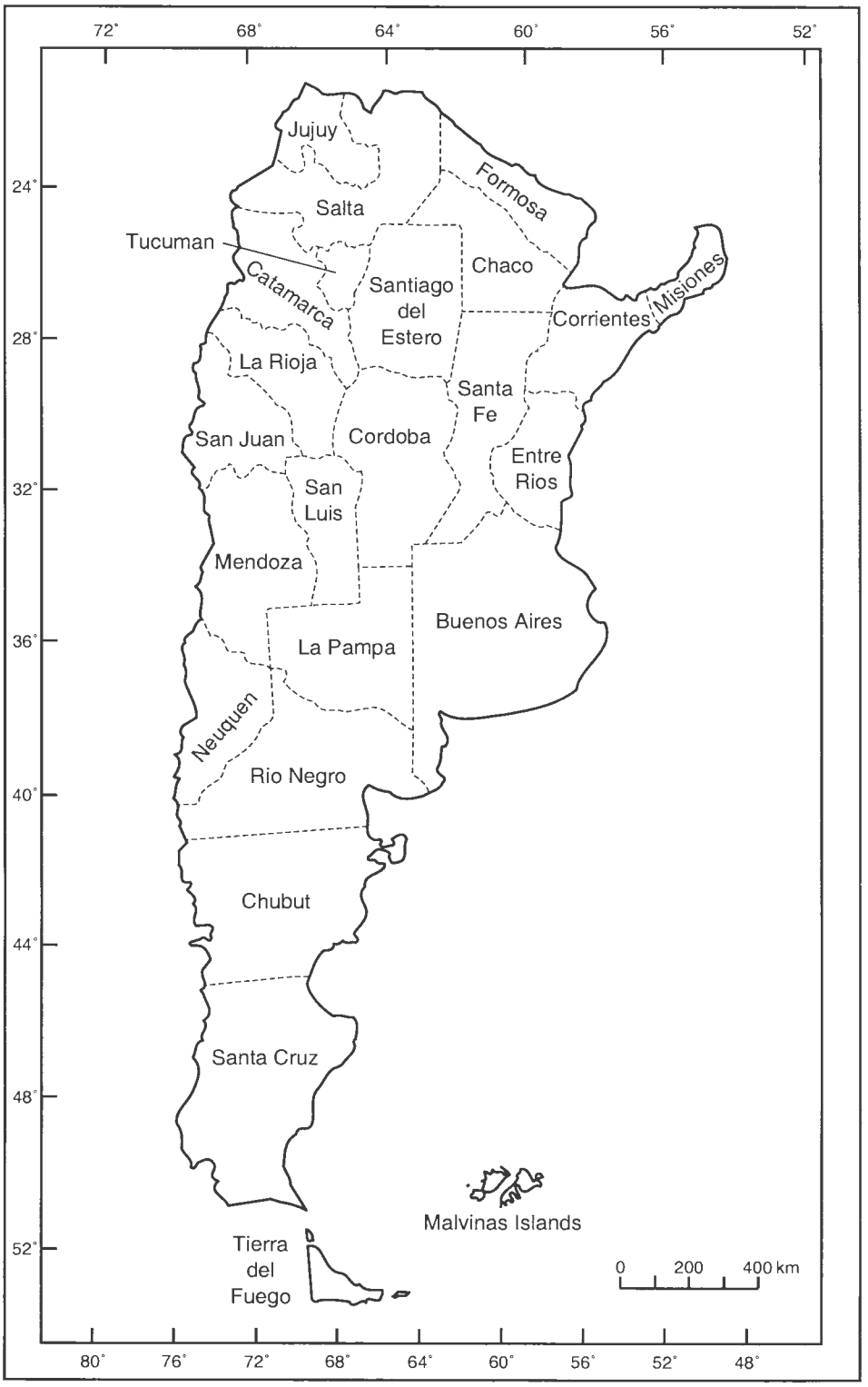


Figure 4. Provinces of Argentina.

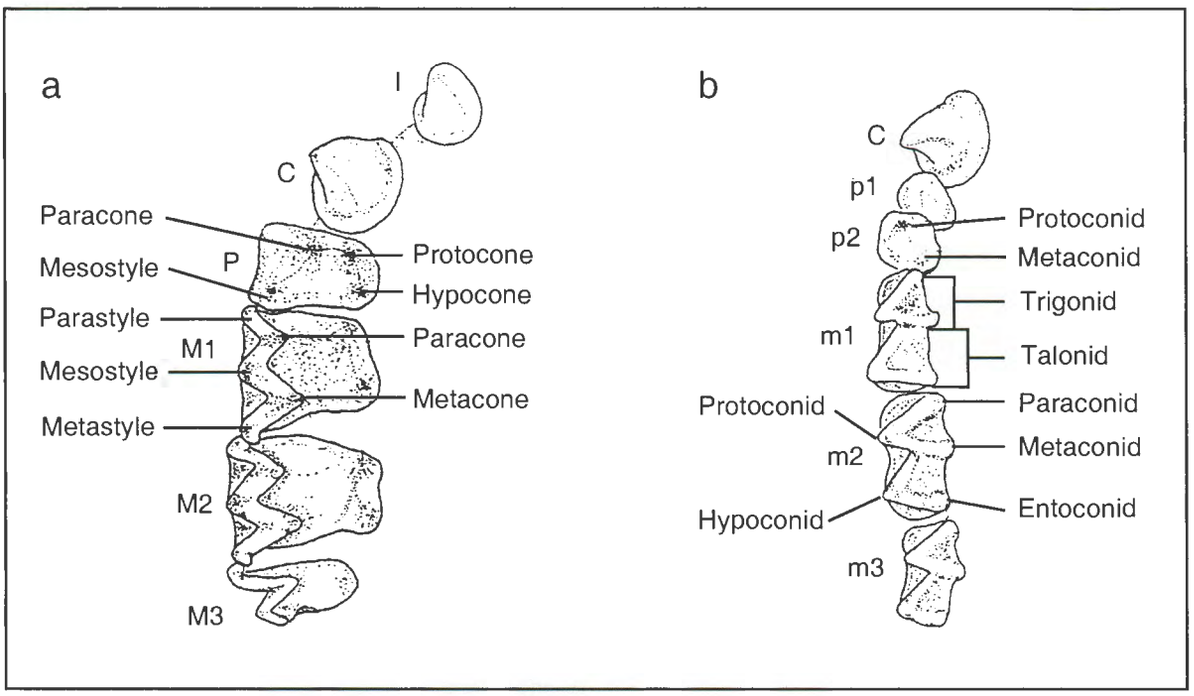


Figure 5. Cusps of the teeth of the: (a) maxilla and the (b) mandible. Abbreviations: C, canine; P or p, premolar; M or m, molar. 1, 2, and 3 indicate first, second, and third, respectively.

TAXONOMIC KEYS TO THE BATS OF ARGENTINA

Keys were developed from an examination of museum specimens and other data obtained in the field. Diagnostic characters mentioned in the keys were determined after examining the variability of the species within its range of distribution in Argentina.

TEXT

We report the first use of the scientific name for each species or subspecies. More extensive synonymies are provided in cases where the taxonomic history is more complex.

The type locality is, in general, that given in the first citation. It is presented in a separate section because in many cases further discussion is necessary. Distribution outside Argentina is based on the literature; distribution in Argentina is based on our research, with comments on uncertain or doubtful records.

Species descriptions are based, whenever possible, on specimens collected in Argentina or, when specimens from Argentina were scarce, on specimens from neighboring countries. All species or subspecies are described.

Color is rather subjective and may be affected by factors such as state of preservation, time in storage, pelage deterioration, treatment of skins with chemicals, temperature, humidity, and light, as well as such biological factors as individual and population variability. In some cases, color is useful in helping discriminate between similar taxa and we use simple descriptions of color patterns where these are important in distinguishing between similar species or subspecies.

Skull characters that aid in identification are presented. Dental formula and tooth descriptions (Fig. 5) follow Miller (1907) and Handley (1959). The sample size, mean, range, and standard deviation for external and cranial measurements are given in the text or in tables. The number of specimens available for each species, when grouped by sex, age, or particular area, was not sufficiently large to allow a more detailed statistical analysis (see Willig, 1983, for the importance of sample size in bat studies).

The Comments summarize available information on various aspects of the biology of the species.

Specimens Examined lists specimens that were examined by us and identified as to taxon. Localities

are given for each specimen as they were written on the tags, with obvious errors corrected.

Additional Records lists specimen records found in the literature that were unambiguously assignable to a particular taxon. Localities of museum specimens that were not examined were included only when the species was easily identifiable.

DESCRIPTION OF SPECIES

In general, the arrangement of species follows Cabrera (1958), although recent information on the relationships of families, subfamilies, genera, and subgenera is included. The Subfamily Sturnirinae is not recognized. Species of the Genus *Sturnira* have been included in the Subfamily Stenodermatinae of the Family Phyllostomidae. The Family Desmodontidae is not recognized, but is considered a subfamily of Phyllostomidae. The Genus *Dasypterus* is recognized as a valid genus. The Genus *Cynomops* is considered distinct from *Molossops* (Thomas, 1920*a*), and *Nyctinomops* as distinct from *Tadarida* (Freeman, 1981*a*). Other differences with respect to Cabrera (1958) are discussed in the Description section of each species account, and deal primarily with the validity of scientific names, clarification of the synonymy, spelling, and distribution.

ACCOUNTS OF SPECIES

KEY TO THE FAMILIES OF ARGENTINE BATS

1. Nose leaf present, well developed, and triangular in shape, or reduced and rounded. ..... Phyllostomidae (p. 19)
1'. Nose leaf absent. 2

2 (1'). Approximately one-half of the tail included in the uropatagium and one-half is free ..... Molossidae (p. 160)
2'. Tail long and almost completely included in the uropatagium, or short and appearing on the dorsal surface of the uropatagium 3

3 (2'). Tail very long and almost completely included in the uropatagium ..... Vespertilionidae (p. 86)
3'. Tail short, included in the uropatagium, but tip appearing on the dorsal surface ..... Noctilionidae (p. 11)

FAMILY NOCTILIONIDAE

KEY TO THE SPECIES

1. Length of forearm > 70 mm; length of hind foot > 25 mm; wingspan about 500 mm ..... *Noctilio leporinus*
1'. Length of forearm < 70 mm; length of hind foot < 20 mm; wingspan about 400 mm ..... *Noctilio albiventris*

Genus *Noctilio*

Description.— Size medium to large when compared with other American bats, with *Noctilio leporinus* being larger than *Noctilio albiventris*. The rostrum is elevated and the muzzle is pointed; a nose leaf is absent and the nares open down and forward. The upper lip has a pronounced vertical groove or fold of skin, conferring a hare-like (leporine) aspect. The ears are tubular or funnel-shaped, large, and separated; the tragus is small and serrated. The wings are long and narrow, and attach to the body just below the knees. The femur is shorter than the tibia, which is well developed, particularly in *N. leporinus*. Claws are long, sharp, and hooklike. The calcar is large and plays a functional role in the motion of the uropatagium when prey are seized. The tail is short, extending to the middle of the uropatagium and protrudes through the dorsal surface. Pelage color varies, but always has red, orange, or yellow tones. A pale mid-dorsal stripe may be present.

The skull is similar in both species, excluding size and arrangement of molars and premolars. In *N. leporinus* spaces are present between the molars, whereas in *N. albiventris* these gaps are not readily apparent. Skull shape is distinctive; the braincase is high and the sagittal crest is well developed, particularly in adult males. The rostrum is short, approximately one-half of the length of the braincase. The palate is concave and extends posteriorly beyond the toothrows. The tympanic bullae are small.

The dental formula is I 2/1, C 1/1, P 1/2, M 3/3, total 28. In the upper toothrow, I2 is smaller than I1 and lies behind it; P1 has well-developed cusps; M1 and M2 are similar in size and, in *N. albiventris*, lack posterior emarginations (posterior emarginations are present in the premolars of *N. leporinus* so that there are no clearly defined spaces between them). The lingual side of C1 is slightly concave and has a medial ridge, whereas the labial side is uniformly convex. Another difference between species in this genus is that in *N. albiventris* the hypocone of M1 and M2 is relatively larger than that of *N. leporinus*. Additionally, M1 and M2 have a commissure that connects the hypocone with the commissure connecting the protocone and metacone. The occlusal surface of M3 is one-half the size of M2.

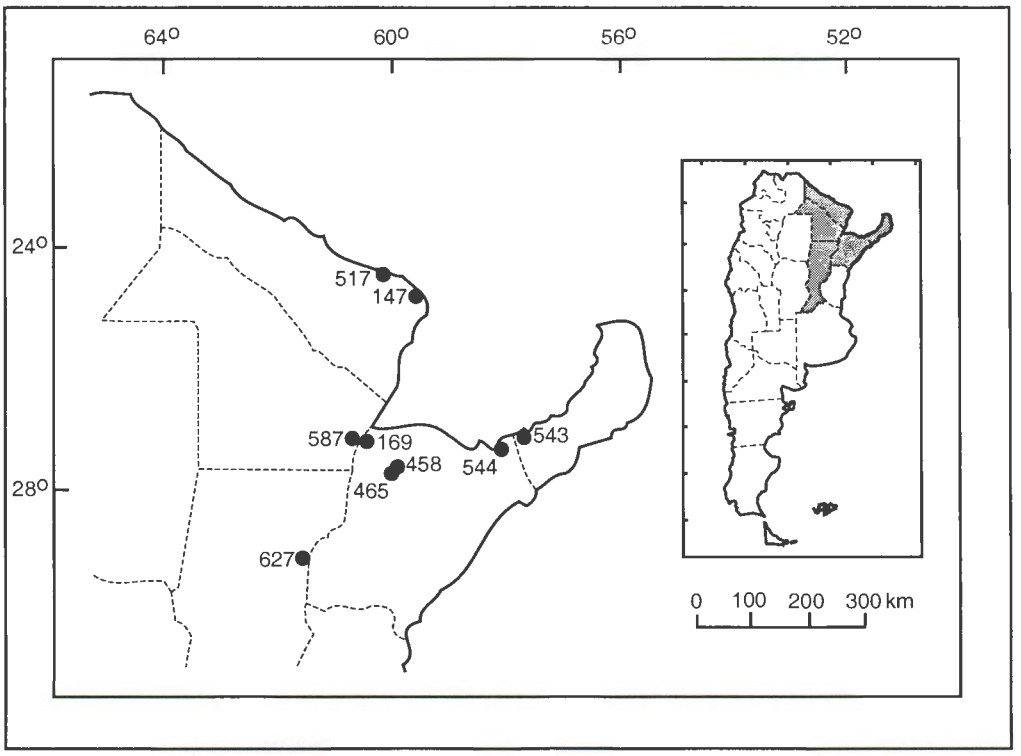


Figure 6. Map of the localities of *Noctilio albiventris*.

Noctilio albiventris Desmarest

Noctilio albiventris Desmarest, Nouveau dictionnaire d'histoire naturelle, appliquèe aux arts, principalment à l'agriculture, et à l'economie rurale et domestique; par une société de naturalistes. Nouvelle edition, presqu' entierement refondue et considerablement augmentee. Ch. Deterville, Paris, 23:15, 1818.

Type Locality.— Brazil, Bahía, Rio São Francisco.

Distribution.— Paraná River basin in southern Brazil, Paraguay, and Argentina northward to southern Mexico. Hood and Pitocchelli (1983) described the distribution of *N. a. cabrerai* as including western Uruguay, northeastern Argentina, Paraguay, eastern Bolivia, and those parts of adjacent Brazil. However, Anderson et al. (1982) and Anderson (1997) did not mention specimens of this subspecies from southeastern Bolivia. Davis (1976) described *N. a. cabrerai* and differentiated it from neighboring populations of *N. a. affinis* by its smaller size and paler color. Myers and Wetzel (1983) noted that measurements of specimens from many of the localities cited by Davis (1976), in addition to their own specimens, suggested a more complex situation. We have summarized their results below. Specimens from the Department of Beni, Bolivia, which according to Davis (1976) belong to *N. a. affinis*, are small but slightly larger than *N. a. cabrerai*, and strikingly different than nearby samples of *N. a. cabrerai* from Magdalena and San Joaquín, also located in Beni. Specimens from Santa Cruz are significantly larger than those from Beni and are similar in size to those from the western Amazon basin. Populations from central and southern Paraguay are similar to those from Beni and are slightly larger than *N. a. cabrerai*, but much smaller than those from Santa Cruz. Myers and Wetzel (1983) also pointed out that the average size of *N. a. affinis* (sensu Davis, 1976) seems to result from a mixing of the highly heterogeneous populations from Beni and Santa Cruz. We examined five male specimens (CML) from Beni. In almost all measurements, specimens from Resistencia, Chaco Province, Argentina, are larger than the specimens from Beni. Based on the distributions given by Davis (1976), the specimen from Chaco should pertain to *N. a. cabrerai*; however, it is morphometrically more allied with *N. a. affinis*. Ibáñez Ulargui (1981) reported that the Llanos de Apure in Venezuela are located in an area supporting different subspecies of *N. albiventris* and also noted that forearm measure-

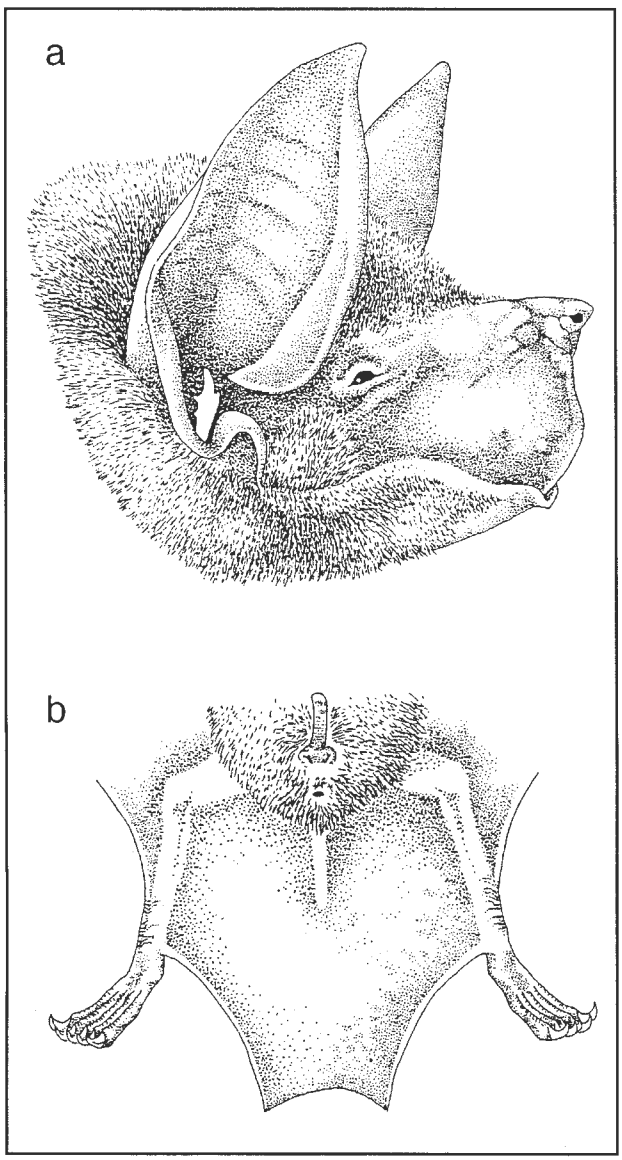


Figure 7. *Noctilio albiventris*: (a) face and (b) uropatagium.

ments of specimens from Romang, Santa Fe Province, Argentina, given by Crespo (1974), are similar to *N. a. affinis* from the upper Amazon, rather than *N. a. cabrerai*. Clearly, the taxonomic status of the subspecies is unresolved.

Distribution in Argentina (Fig. 6).— Burmeister (1879) reported *N. leporinus* in Salta Province; however, Cabrera (1938), based on Burmeister's descriptions, treated it as *N. albiventris* rather than *N. leporinus*. *N. albiventris* has not been collected in northwestern Argentina.

Description (Figs. 7 and 8).— Size is much smaller than *N. leporinus*. Pelage color ranges among various shades of brown, gray, orange, and yellow. Sexual dimorphism in color is common, females being browner than males; a pale mid-dorsal stripe may be distinct, hardly evident, or absent. Males are usually slightly larger than females and have a more pronounced sagittal crest, which may be absent or not readily apparent in young specimens and females; males generally are heavier than females. Feet are long and robust, but less so than *N. leporinus*.

Measurements.— Table 1.

Comments.— Most specimens captured by Myers and Wetzel (1983) in the chaco flew over lakes or rivers; two were found in roosts in "quebracho" (*Aspidospermum* sp.) trees, one roosting in a hollow tree with the entrance 1 m above the ground and the other roosting in a horizontal branch 20 cm in diameter and 6 m above the ground. Roosts also are placed in houses and buildings. Smith and Starrett (1979) noted the ability of this species to fly through dense vegetation; other investigators have commented on their foraging over water, sometimes flying in groups over rivers and streams.

Food habits are similar to those of *N. leporinus*, except for a greater preference for aquatic insects. Whitaker and Findley (1980) studied fecal pellets and found remains of Coleoptera (Dytiscidae, Carabidae), Hemiptera, Homoptera (Cercopidae), Lepidoptera, and Diptera; Dytiscidae was the most abundant prey (22.5% of the total volume). Howell and Burch (1974) observed individuals feeding on mulberry fruits (Moraceae).

Nothing is known about the reproductive biology of this species in Argentina. Myers and Wetzel (1983) captured pregnant females in the chaco of Paraguay in August and October, lactating females in September, and a young individual in January. Ibáñez Ulargui (1981) reported that females had well-developed fetuses in Venezuela in late January, gave birth from mid-May to early June, and lactated until late July. Mating probably occurred from late December to January, with a gestation period lasting about five months. He suggested that this Neotropical species has a seasonal monoestrous sexual cycle in the region of "Hato El Frío." Given the differences in timing of reproduction in Venezuela and Paraguay, it is unlikely that a consistent seasonality characterizes the reproductive cycle of this species throughout its range.

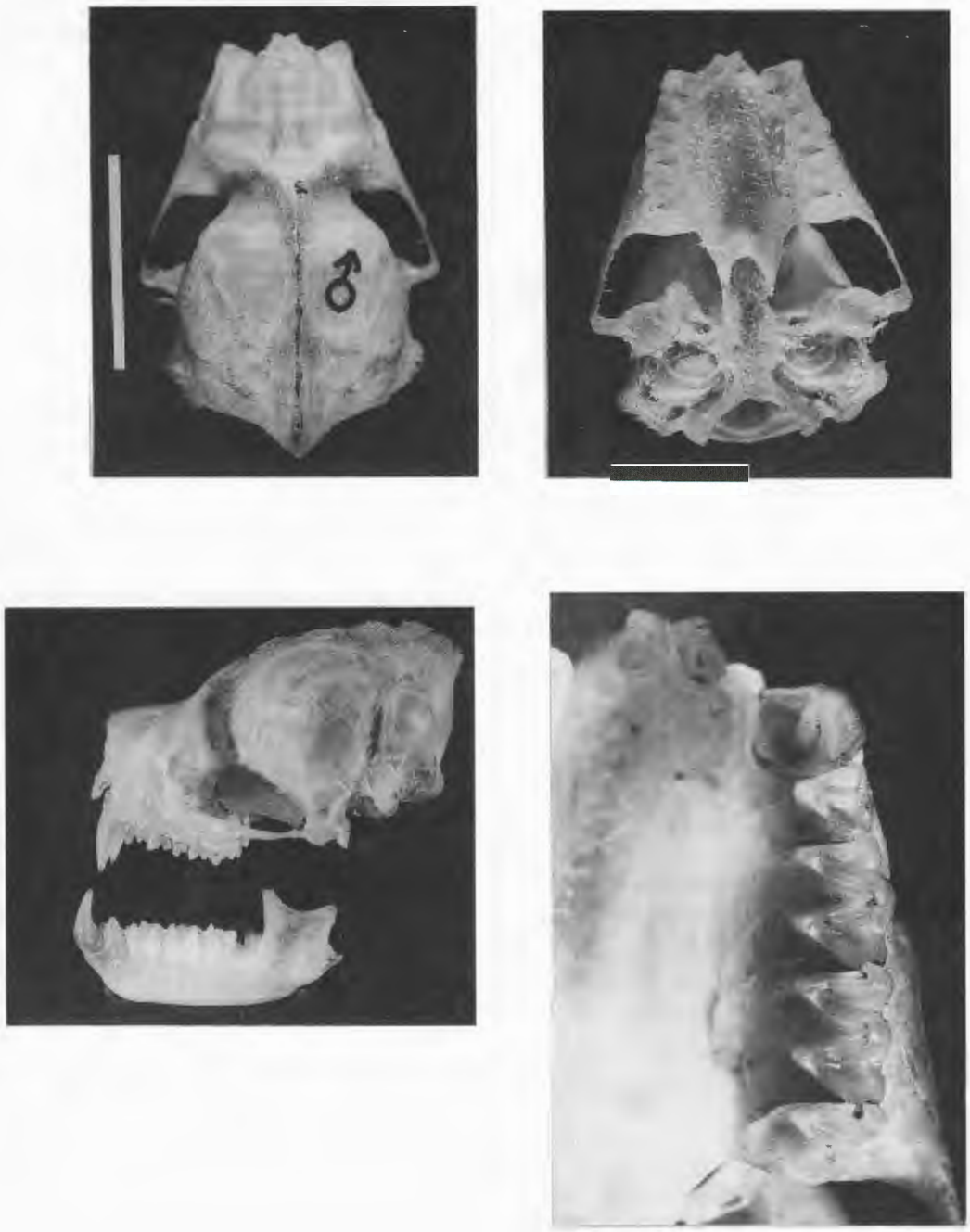


Figure 8. Skull and teeth of *Noctilio albiventris*. Adult male from Departamento Beni, Bolivia (CML 1408). Bar = 1 cm. Teeth not to scale.

Specimens Examined (27).— CORRIENTES: Corrientes, 1 (ROM); Mburucuyá, 13 (MACN); Posadas, 61 km W, along Hwy 12, 2 (1 CML, 1 OMNH). MISIONES: Posadas, 1(MACN). SANTA FE: Romang, Isla El Laurel, 10 (MACN).

Additional Records.— CHACO: Apipé Grande (Romaña and Abalos, 1950); Resistencia (Fornes and Massoia, 1968). CORRIENTES: Manantiales (Fornes and Massoia, 1967). FORMOSA: Clorinda (Davis, 1976; TCWC not examined); Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.).

Table 1. Measurements of Noctilio albiventris *and* Noctilio leporinus. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Noctilio albiventris*	*Noctilio leporinus*
Total length	95.0 ± 2.72, 4	121.0 ± 19.79, 2
	92.5 - 98.9	107.0 - 135.0
Tail length	11.4 ± 0.49, 4	19.0 ± 5.65, 2
	10.8 - 12.0	15.0 - 23.0
Hindfoot length	14.5 ± 0.53, 4	28.5 ± 2.12, 2
	14.0 - 15.1	27.0 - 30.0
Ear length	19.9 ± 1.42, 4	26.0 ± 0.00, 2
	19.0 - 22.0	26.0 - 26.0
Forearm length	63.3 ± 2.46,12	88.6 ± 4.04, 3
	58.0 - 66.0	85.0 - 93.0
Condylobasal length	19.0 ± 0.68, 4	24.6 ± 1.13, 3
	18.5 - 20.0	23.3 - 25.4
Least interorbital breadth	8.6, 1	11.3 ± 0.95, 3
		10.4 - 12.3
Zygomatic breadth	15.6 ± 0.66, 4	19.8 ± 1.00, 3
	14.7 - 16.2	18.7 - 20.6
Greatest length of skull	21.1 ± 0.44, 5	26.7 ± 1.79, 3
	20.5 - 21.6	24.7 - 27.9
Postorbital constriction	6.0 ± 0.16, 5	6.9 ± 0.30, 3
	5.8 - 6.2	6.6 - 7.2
Breadth of braincase	11.4 ± 0.56, 5	13.8 ± 0.62, 3
	10.6 - 12.2	13.1 - 14.3
Length of maxillary toothrow	8.1 ± 0.45, 5	10.4 ± 0.40, 3
	7.8 - 8.9	10.0 - 10.8
Palatal length	9.3 ± 0.24, 5	12.2 ± 0.68, 3
	9.0 - 9.6	11.5 - 12.8
Mastoidal breadth	13.8 ± 0.87, 5	17.3 ± 1.70, 3
	12.8 - 14.9	15.6 - 19.0
Length of mandibular toothrow	7.4 ± 0.19, 5	9.9 ± 0.61, 3
	7.3 - 7.8	9.3 - 10.5
Length of mandible	14.9 ± 0.21, 5	19.3 ± 1.21, 3
	14.7 - 15.3	17.9 - 20.0
C-C (width across canines)	7.3 ± 0.23, 5	9.3 ± 0.62, 3
	7.0 - 7.6	8.6 - 9.8
M-M (width across molars)	9.9 ± 0.13, 5	12.4 ± 0.49, 3
	9.7 - 10.0	11.9 - 12.8

Noctilio leporinus (Linnaeus)

[*Vespertilio*] *leporinus* Linnaeus, Systema Naturae per regna tria naturae, secundum classis, ordines, genera, species cum characteribus, differentiis, synonymis, locis. Tenth ed. Laurentii Salvii, Stockholm, 1:32, 1758.

Noctilio leporinus: Gray, Synopsis of the species of the Class Mammalia, as arranged with reference to their organization, by Cuvier, and other naturalists, with specific characters, synonyma, &c &c, vol. 5, *in* The animal kingdom arranged in conformity with its organization, by the Baron Cuvier, with additional descriptions of all the species hitherto named, and of many not before noticed (E. Griffith, C. H. Smith, and E. Pidgeon, eds.). G. B. Whittaker, London, p. 67, 1827.

Type Locality.— Restricted to Suriname by Thomas (1911).

Distribution.— Extending from western Mexico eastward to the Yucatan Peninsula, and southward to northern Argentina. Three subspecies are recognized; only one occurs in Argentina.

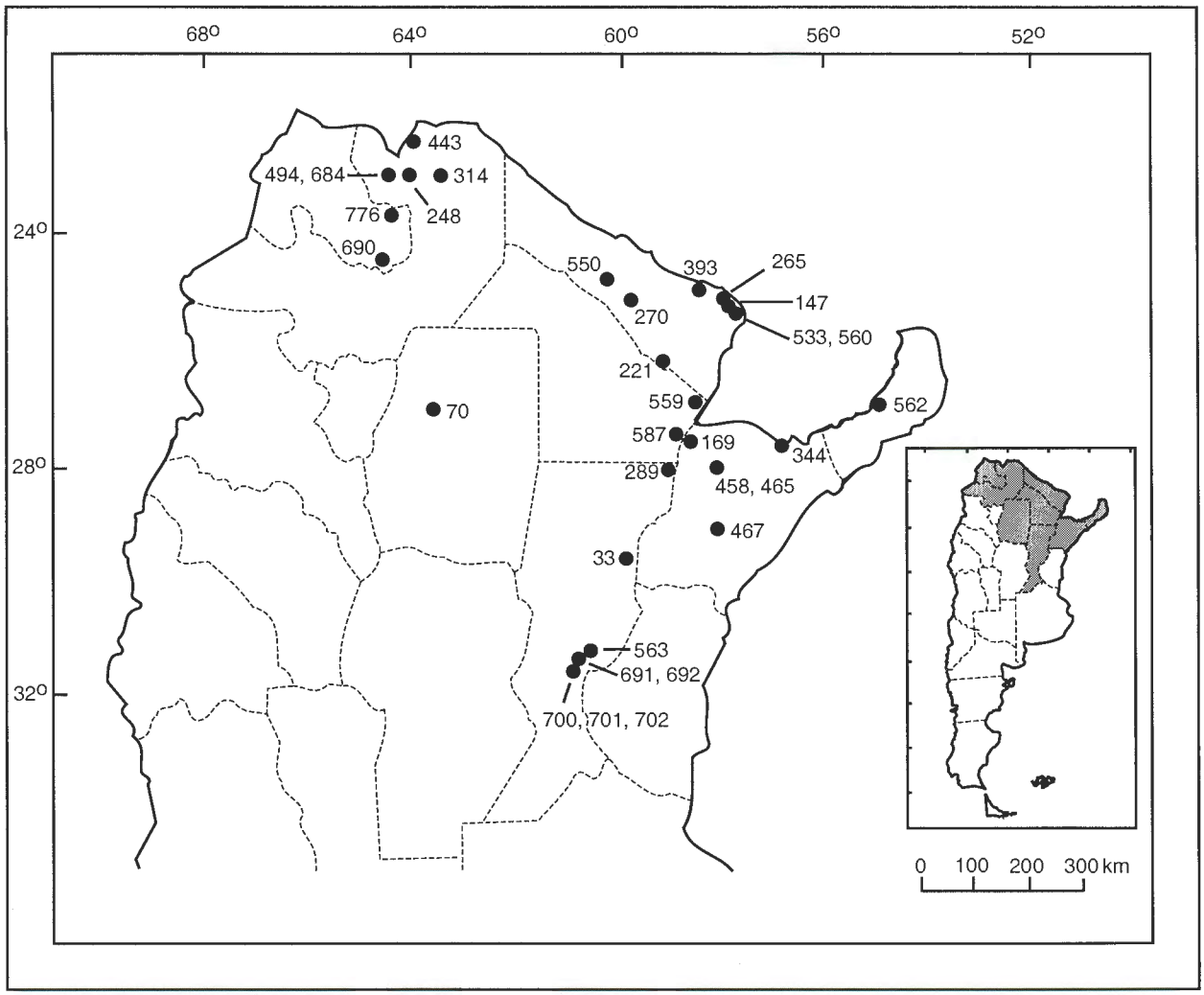


Figure 9. Map of the localities of *Noctilio leporinus*.

Noctilio leporinus rufescens Olfers

N[*octilio*]?*rufescens* Olfers, Bemerkungen zu Illiger's Ueberblick der Säugethiere nach ihrer Vertheilung uber die Welttheile, rücksichtlich der Südamerikanischen Arten (species) (Abhandlung 10 of Wilhelm Ludwig Eschwege's Journal von Brasilien..., vol. 15, heft 2, of the "Neue Bibliothek des wichtigsten Reisenbeschreibungen zur Erweiterung der Erdund Volkerkunde..." edited by F. T. Bertuch, Weimar, p. 225, 1818.

Noctilio leporinus rufescens: Hershkovitz, Journal of Mammalogy, 40:340, 1959.

Type Locality.— Apparently there is no type specimen (Davis, 1973). The name *rufescens*, from the *Chauve-souris rougeatre* (reddish bat) of Azara (1801) from Paraguay, should have priority over *Noctilio rufipes* d'Orbigny (1836), from Río San Miguel, Guarayo, Bolivia, according to Hershkovitz (1959). Hood and Jones (1984) also accepted *rufescens*, considering *rufipes* as a synonym. Consequently, the type locality of this subspecies should remain as "Paraguay," the correct synonym being that mentioned by Davis (1973).

Distribution.— This subspecies is known from Bolivia (Beni, Cochabamba, La Paz, Santa Cruz, and Tarija), Paraguay, southeastern Brazil (Santa Catarina, São Paulo, and Rio Grande do Sul), and northern Argentina, northward to Sinaloa, Mexico, and Trinidad.

Distribution in Argentina.— Figure 9.

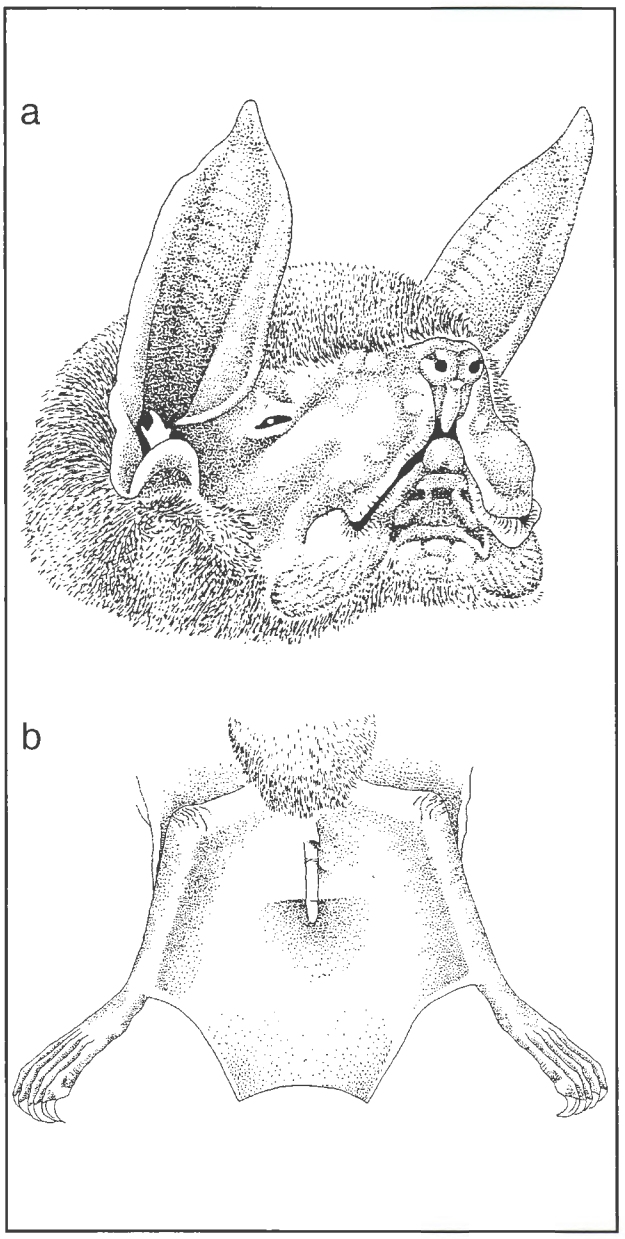


Figure 10. *Noctilio leporinus*: (a) face and (b) uropatagium.

Description (Figs. 10 and 11).— This subspecies is larger than *N. l. leporinus*. Forearm length ranges from 89.7 to 93 mm. Pelage color varies among shades of orange, red, and brown. According to Davis (1973), the brown phase should not be interpreted as a molting stage. Davis (1973) noted that males from Chiapas, Mexico were highly variable in color, and suggested that both sexes were probably equally variable in color. There also is variation in color in Argentina. A specimen from the province of Santiago del Estero, for example, was much paler than specimens from Salta Province and had a more distinct and whiter dorsal stripe. The hairs of the venter were pale brown with white tips. Specimens from Salta Province have a yellowish or creamish dorsal stripe and are bright orange on the venter (only slightly paler than the dorsum). Sexual dimorphism in morphometric characteristics and in color pattern have been reported (Allen, 1937; Willig, 1983). Although the sample from Argentina is not large enough to ascertain character variability, the specimen from Santiago del Estero, an adult male, has a well-developed sagittal crest. In contrast, the sagittal crest on specimens from Salta was poorly developed, although all were collected in the same season.

Measurements.— Table 1.

Comments.— This species is rare in Argentina. It roosts in hollow trees, rock fissures, caves and, less frequently, houses. It generally is found near water. The main food is fish, aquatic insects, and crustaceans. Prey are seized by the claws while flying over the water. Myers and Wetzel (1983) captured a specimen that had a partly eaten toad in its mouth. Goodwin and Greenhall (1961) found remains of Scarabidae, Elateridae, Cerambycidae, Gryllotalpidae, Blattidae, and flying ants in stomachs of specimens from the Virgin Islands. Ibáñez Ulargui (1981) reported that 61% of stomachs examined contained fish and 56% contained insects. Dobson (1878) found fruit remains, probably *Morus tinctoria*, in the gut of specimens from British Guiana (Guyana). Moths may be seized in flight using the uropatagium (Villa-R., 1967).

Willig (1983) observed groups of more than 30 individuals in day roosts in trees in the Brazilian caatinga, and flying in feeding groups of 3 to 15 individuals. He also observed a group of about 150 individuals in a night roost located below a bridge over a stream, as well as a large amount of guano that suggested extensive use of the roost. Some specimens from the FCM collection were captured 300 m inside wastewater tunnels in the city of Santa Fe, Santa Fe Province, Argentina.

Nothing is known concerning reproduction of *N. leporinus* in Argentina. Myers and Wetzel (1983) reported pregnant females in August and September, and

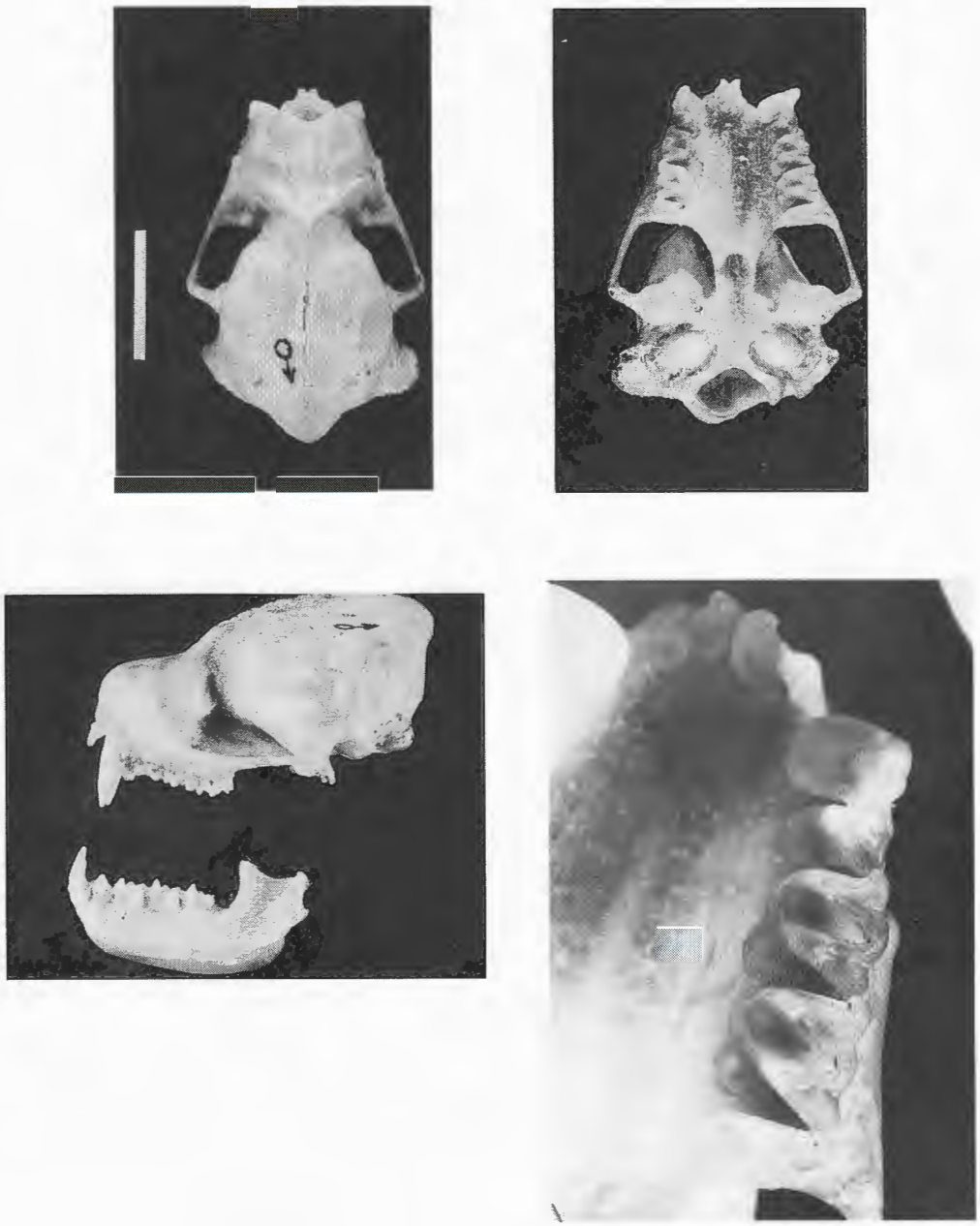


Figure 11. Skull and teeth of *Noctilio leporinus*. Adult male from Bañado de Figueroa, Santiago del Estero Province (CML 1629). Bar = 1 cm. Teeth not to scale.

lactating females in April in the Paraguayan chaco. Ibáñez Ulargui (1981) suggested a non-seasonal reproductive cycle for this species in Venezuela; lactating females were found in February, June, and November, and pregnant females in June and September.

Specimens Examined (67).— CORRIENTES: Manantiales, 46 (MACN); Mburucuyá, 7 (MACN). FORMOSA: Clorinda, 2 (MACN); Puerto Pilcomayo, 1 (TCWC). MISIONES: Puerto Rico, 1 (MACN). SALTA: Los Madrejones, Junta de los Ríos Tarija e Itaú, 1400 m, 4 (CML); Orán, 1 (MACN); San Ramón de la Nueva Orán, 1 (MACN). SANTA FE: Santa Fe, Ciudad, 3 (FCM). SANTIAGO DEL ESTERO: Bañado de Figueroa, Río Salado, 1 (CML).

Additional Records.— CHACO: Puerto Bermejo (Barquez and Ojeda, 1992); Resistencia (Cabrera, 1938). CORRIENTES: Corrientes (Davis, 1973); Isla Apipé Grande (Cabrera, 1938); Mercedes (Davis, 1973). FORMOSA: Clorinda (TCWC, not examined); El Colorado (Massoia, 1970); Estancia Las Mercedes (TCWC, not examined); Estanislao del Campo (Davis, 1973); Laguna Blanca (Massoia, 1970); Pilcomayo (Barquez, 1987) (=Puerto Pilcomayo); Pozo del Tigre (Davis, 1973). JUJUY: Santa Clara (Yepes, 1944); Yuto (Davis, 1973). SALTA: Embarcación, Finca Tres Pozos, 247 km NE San Salvador de Jujuy (Villa-R. and Villa-C., 1971); Hickman (Villa-R. and Villa-C., 1971). SANTA FE: Alejandra (MFA, not examined); Florencia (Cabrera, 1938); Puerto Santa Fe (MFA, not examined); Santa Fe (MFA, not examined); Sauce Viejo (MFA, not examined); Sauce Viejo, 17 km al N, cruce del Arroyo Negro con Río Santa Fe (Martinez Achembach, 1967); Sauce Viejo, Río Coronda (Martinez Achembach, 1967).

FAMILY PHYLLOSTOMIDAE

Excluding the members of the Subfamily Desmodontinae, the remaining phyllostomids in Argentina can be distinguished easily by the presence of a nose leaf, a fleshy appendage located on the upper forepart of the muzzle. Most species in this family have a tail enclosed in a caudal membrane or uropatagium, but the tail may be absent or, if present, may vary in size among species. In general, the wings are broad, which allows for slow and maneuverable flight. The diversity of food habits is greater than in other Neotropical bat families; food items include nectar, pollen, fruit, small vertebrates (amphibians, birds, and mammals), insects, and blood. In Argentina, the family occurs mainly in the warm forested regions of the Northeast and Northwest. Five subfamilies have been recorded in Argentina.

KEY TO THE SUBFAMILIES

1. Nose leaf rudimentary, without distinct upright process; uropatagium reduced; calcar small, almost absent; the single pair of upper incisors and canines enlarged and bladelike, with sharp cutting edge ..... Desmodontinae (p. 78)

1'. Nose leaf well developed, with a distinct free upright process (lancet-shaped); upper incisors and canines not enlarged and bladelike 2

2 (1'). Ears well developed, generally extending far beyond the nose when folded forward; upper molars markedly W-shaped; calcar well developed; tail visible and generally well developed ..... Phyllostominae (p. 20)

2'. Ears not extending beyond the nose when folded forward; upper molars without W-shaped pattern; calcar small or absent; tail barely visible, reduced, or absent 3

3 (2'). Distinct longitudinal lines or patches present on different areas of the body and face ..... Stenodermatinae (p. 45)

3'. Lines or patches absent 4

4 (3'). Muzzle short; tongue short and fleshy (thick); uropatagium well developed, with a minute tail; lower lip not grooved, and chin with a large wart surrounded by smaller ones ..... Carolliinae (p. 41)

4'. Muzzle narrow and elongated; tongue long, thin, and protractile; uropatagium variable to almost absent; deep groove in the upper surface of the center of the lower lip ..... Glossophaginae (p. 33)

SUBFAMILY PHYLLOSTOMINAE

This subfamily is characterized by its molars, which have distinctive W-shaped and well-developed commissures. The nose leaf and uropatagium are well developed in all species. The tail may be well developed, reaching the edge of the uropatagium as in the Family Vespertilionidae (e.g., *Macrophyllum*), moderately developed and protruding through the upper part of the uropatagium (e.g., *Tonatia*), or barely visible (e.g., *Chrotopterus*). Olrog (1958) reported the genus *Phyllostomus* for Argentina, but we were unable to locate the specimen corresponding to this record. Because the information provided by Olrog (1958) was insufficient to establish an identification, the genus is not included in Argentina.

KEY TO THE SPECIES

1. Size small; length of forearm about 36 mm; tail long and included in the uropatagium, nearly reaching its free margin; ventral surface of the uropatagium with longitudinal rows of dermal denticles; incisors 2/2 ..... *Macrophyllum macrophyllum*

1'. Size larger; length of forearm > 50 mm; tail reduced, uropatagium without dermal denticles; incisors 2/1 2

2 (1'). Length of forearm > 70 mm (78-83 mm); tail short and hardly visible, not appearing on the dorsal surface of the uropatagium; coloration dark gray; ears large (35-45 mm); p2 displaced to lingual side of the toothrow, so that it is not visible from the labial side ..... *Chrotopterus auritus*

2'. Length of forearm < 70 mm (55-61 mm); tail appearing on the dorsal surface of the uropatagium; coloration pale grayish or pale reddish; p2 not displaced from the toothrow and is visible from the labial side 3

3 (2'). Ears united by a low band across the forehead; index between the greatest length of the skull and the postorbital constriction ranges from 5.9 to 8.1 mm (this species is likely present in Argentina and is thus included here) ..... *Tonatia silvicola*

3'. Ears clearly separated; index between the greatest length of the skull and the postorbital constriction ranges from 4.2 to 5.4 mm ..... *Tonatia bidens*

Genus *Macrophyllum*
Macrophyllum macrophyllum (Schinz)

Phyllost[oma] macrophyllum Schinz, Naturgeschichte und Abbildungen der Säugethiere. Das Thierreich eingetheilt nach dem Bau der Thiere als Grundlage ihrer Naturgeschichte und der vergleichenden Anatomie von dem Herrn Ritter von Cuvier. Säugethiere und Vögel. J. G. Cotta'schen Buchhandlung, Stuttgart und Tübingen, 1:163, 1821.

Macrophyllum macrophyllum: Nelson, Proceedings of the Biological Society of Washington, 25:93, 1912.

Type Locality.—Brazil, Bahía, Rio Mucuri. Cabrera (1958) indicated that the locality was assigned by Wied-Neuwied (1826). Avila-Pires (1965) recognized Wied-Neuwied (in Schinz, 1821) as first describing the species, although the original specimen studied was not found, and the type specimen was not designated. Husson (1962) claimed that some of the species described in Schinz's "Thierreich" and attributed to "P. Max" should be assigned to Schinz rather than to Wied-Neuwied, since there is no reference by Schinz to anyone other than himself.

Distribution.— Widely distributed from Mexico to eastern South America, including Venezuela, the Guianas, Colombia, Ecuador, Peru, northern Bolivia,

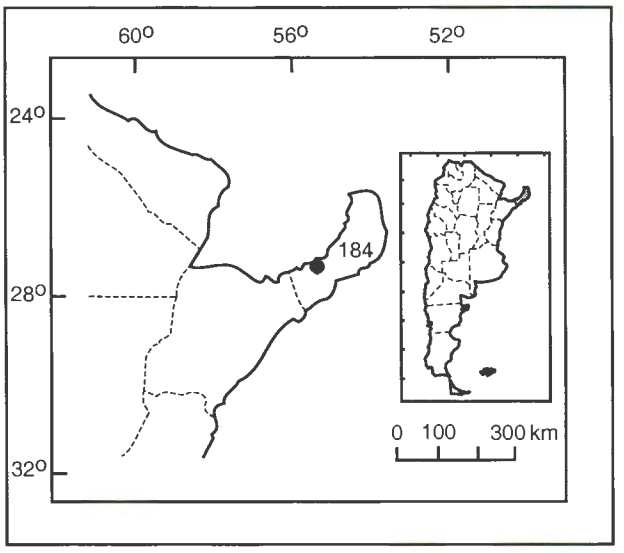


Figure 12. Map of the localities of *Macrophyllum macrophyllum*.

eastern and western Brazil, Paraguay, and northeastern Argentina.

Distribution in Argentina (Fig. 12).— Although this species is widely distributed, it is uncommon or difficult to catch, and there are few known records (see Harrison, 1975; Wilson and Gamarra de Fox, 1991).

Description (Figs. 13 and 14).— Size is small, and the forearm varies from 34 to 39 mm; weight varies from 6 to 9 g. The tail, which is enclosed in the uropatagium, almost reaches the posterior edge, as in vespertilionids. The nose leaf is long and broad, with a conspicuous central keel, many crenulations on the lower edge, and a sharp tip. Four or five well-developed glands are situated behind the nose leaf on both sides of the muzzle. A group of three warts encircled by eight smaller warts is found on the lower lip. The muzzle is short and the eyes small. The wing membranes are broad, naked, and attach at the middle of the tibia. The ears are broad and well developed and sharp at the tip; the inner edge is distinctly convex. The uropatagium is wide and long, completely enclosing the tail. Series of dermal denticles are present along the distal ventral surface of the uropatagium. The feet are long and shaped like *Noctilio*; the outer digit has a single phalanx, whereas the others have two. Dorsal coloration of the pelage is dark brown, the hairs paler at the base; the venter is paler than the dorsum. Olrog and Lucero (1981) described the coloration of this species as blackish brown with a paler venter.

The skull is very small and is characterized by the forward displacement of the maxillae and the retraction of the nasal openings to the second premolars. Proportionally, the rostrum is less than one-half the length of the braincase (measured as the distance from the postorbital constriction to the posteriormost point of the skull). The palate is long, extending posteriorly beyond the edge of the upper toothrow. The hamular processes of the pterygoids are parallel anteriorly and strongly divergent posteriorly. The tympanic bulla is small and encloses less than one-half of the cochlea. The sagittal crest is absent; the zygomatic arch, although fragile, is complete.

The dental formula is I 2/2, C 1/1, P 2/3, M 3/3, total 34. The I1 is large and procumbent; I2 is reduced and only reaches the cingulum of I1. The canines are approximately twice the size of the largest incisor and are curved. The P1 is small, much smaller than P2, and is separated from it by a small gap; viewed laterally, the P2 is higher than the molars. The M1 is the largest tooth in the molar row and, like M2, has well-defined W-shaped commissures. Only two commissures and a trace of a third can be seen on M3. In the lower toothrow, i1 and i2 are small, with trilobulate edges. The anterior face of p1 is in contact with the canines; p2 is small and displaced to the lingual side of the toothrow, so that p1 and p3 are in contact. The m1 and m2 are well developed and similar to one another; m3 is much smaller and the talonid basin is indistinguishable due to the closeness of the hypoconid and entoconid.

Measurements.— Table 2.

Comments.— Studies dealing with this species are scarce and there are no data on its biology in Argentina. Harrison (1975) reviewed its biology. Dickerman et al. (1981) reported the first record from Guatemala; they observed colonies of more than 70 individuals living in sewer systems and noted they were hard to capture. Whitaker and Findley (1980) found Chironomidae, spiders, and Coleoptera in fecal pellets of specimens from Costa Rica and Panama, where bats were captured a few centimeters over the water's surface. Gardner (1977*a*) summarized data on food habits in Panama and mentioned the occurrence of Hemiptera (Guerridae) in stomachs. Davis et al. (1964) collected this species at

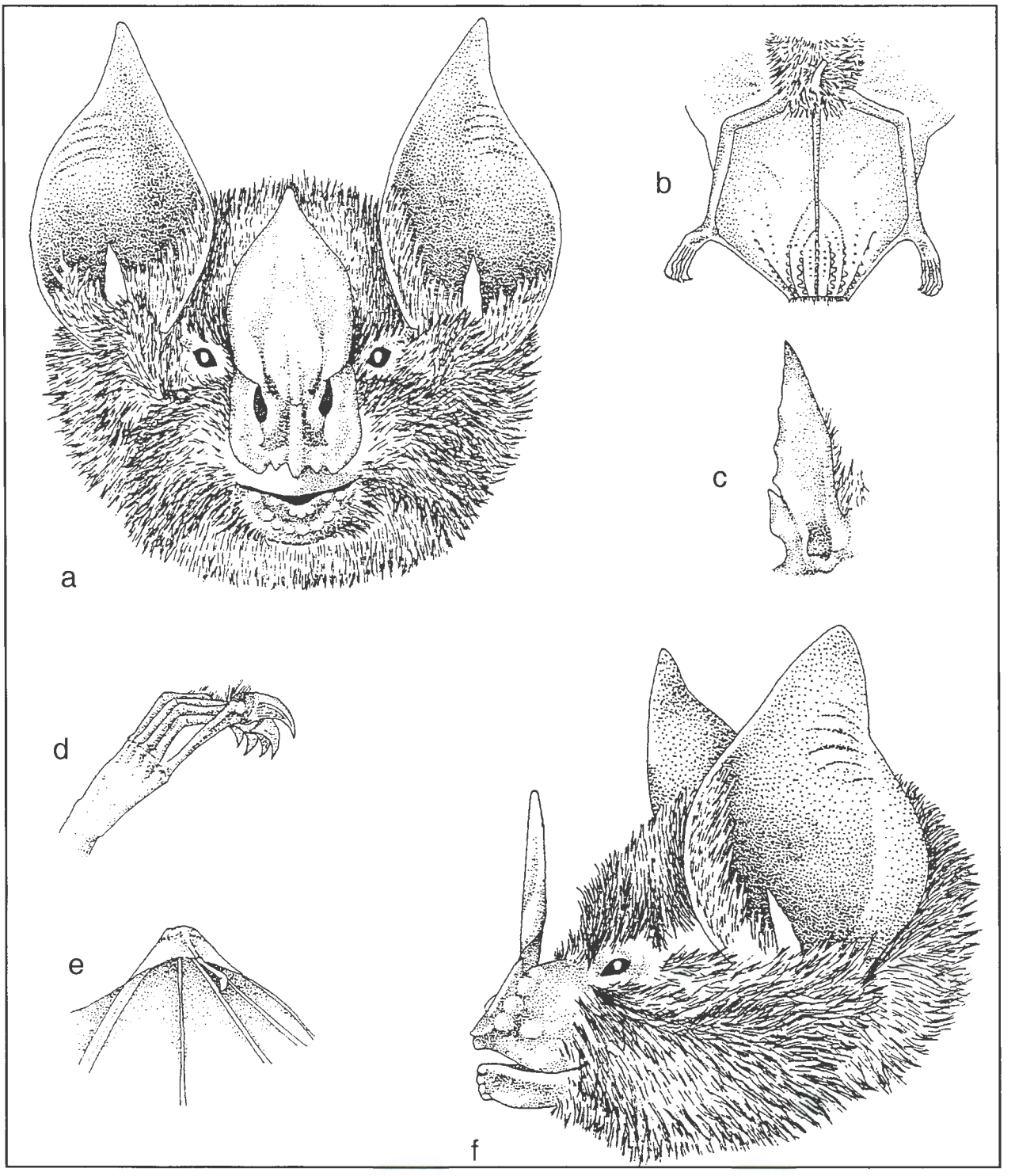


Figure 13. *Macrophyllum macrophyllum*: (a) and (f) face; (b) uropatagium; (c) tragus; (d) hind foot; and (e) articulation of the forearm and digits.

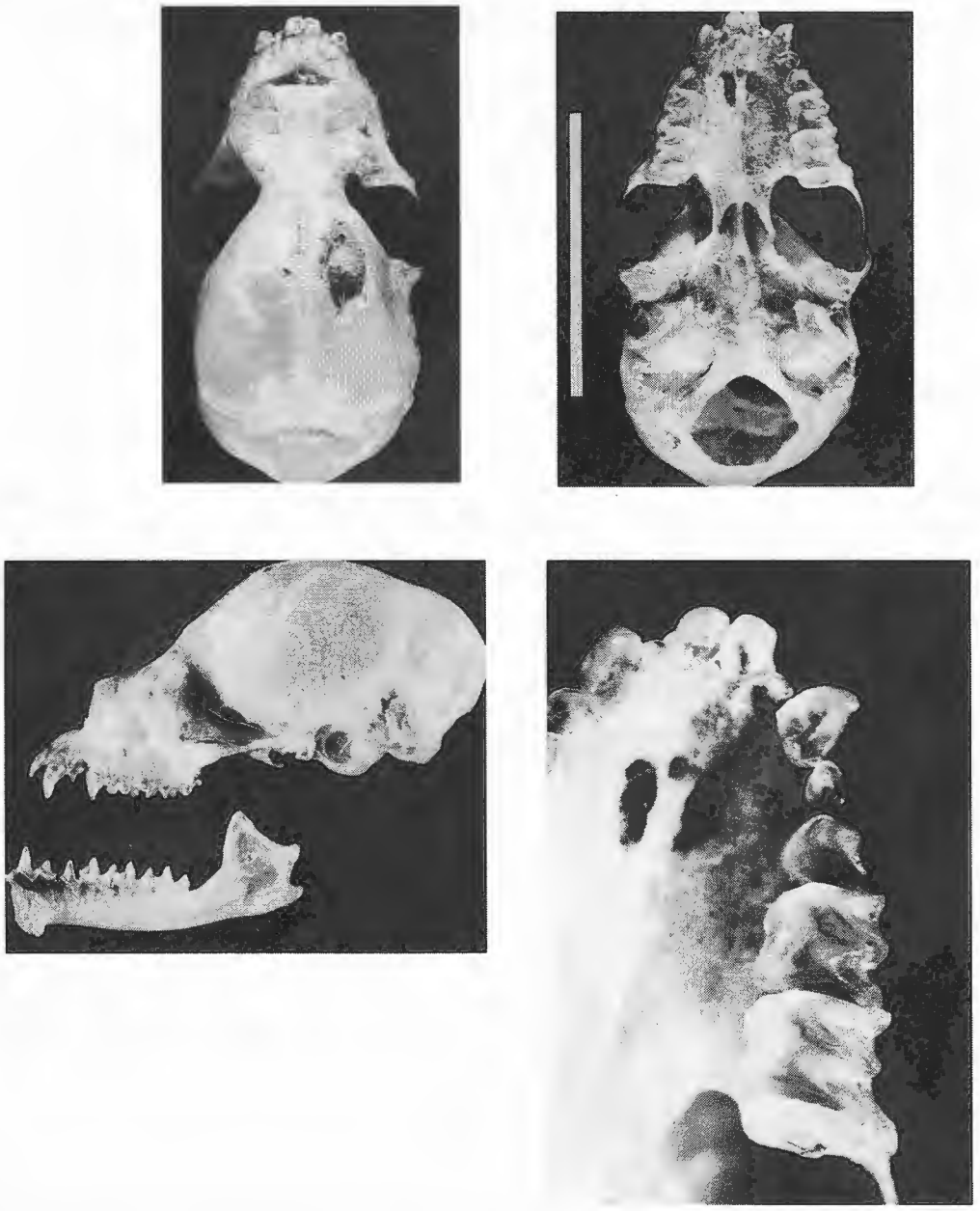


Figure 14. Skull and teeth of *Macrophyllum macrophyllum*. Adult male from Cueva María Antonia, Misiones Province (MACN 17026). Bar = 1 cm. Teeth not to scale.

the bottom of nets placed close to the water which, together with features such as long feet and a large uropatagium, suggested to the authors that this species fed on aquatic insects or small fish, although the stomachs were empty. Seymour and Dickerman (1982) observed the presence of this species in Guatemala inside culverts 1 m wide and 10 m long and with stable water flow; it was absent from sewer systems with no water flow. They noted that males were more common than females, and reported groups formed of males only. Brosset and Charles-Dominique (1990) reported that it roosts in culverts, caves, and subterranean cavities in French Guiana. Wilson and Gamarra de Fox (1991) collected several individuals in the month of February from

Table 2. Measurements of Macrophyllum macrophyllum, Tonatia bidens, *and* Chrotopterus auritus. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Macrophyllum macrophyllum*	*Tonatia bidens*	*Chrotopterus auritus*
Total length	81.0, 1	96.1 ± 5.13, 12 85.6 - 105.0	106.1 ± 9.42, 7 95.0 - 125.0
Tail length	35.0, 1	16.5 ± 2.36, 12 12.0 - 21.0	11.0, 1
Hindfoot length	10.0, 1	15.3 ± 2.30, 12 10.0 - 20.0	21.5 ± 0.86, 7 20.0 - 22.5
Ear length	16.0, 1	25.2 ± 2.25, 12 22.0 - 29.5	39.8 ± 4.68, 7 32.0 - 44.7
Forearm length	36.0, 1	57.6 ± 1.16, 12 55.0 - 59.0	82.0 ± 1.05, 8 80.0 - 83.0
Weight		32.7 ± 9.63, 4 26.0 - 47.0	85.0 ± 7.07, 2 80.0 - 90.0
Condylobasal length	14.3, 1	24.5 ± 0.32, 10 24.1 - 25.1	31.2 ± 0.28, 8 30.9 - 31.8
Least interorbital breadth		7.2 ± 0.40, 5 6.8 - 7.8	8.1 ± 0.31, 7 7.7 - 8.7
Zygomatic breadth		13.6 ± 0.22, 10 13.4 - 14.1	19.1 ± 0.37, 8 18.6 - 19.8
Greatest length of skull	16.3, 1	27.9 ± 0.46, 10 27.3 - 28.7	35.4 ± 0.44, 8 34.6 - 36.2
Postorbital constriction	3.2, 1	5.7 ± 0.12, 10 5.7 - 6.1	6.2 ± 0.11, 8 6.1 - 6.4
Breadth of braincase	7.9, 1	11.2 ± 0.16, 10 11.1 - 11.5	13.9 ± 0.29, 8 13.3 - 14.3
Length of maxillary toothrow	5.5, 1	10.0 ± 0.31, 10 9.7 - 10.8	12.9 ± 0.22, 8 12.6 - 13.3
Palatal length		11.9 ± 0.22, 10 11.6 - 12.3	15.6 ± 0.54, 8 14.9 - 16.6
Mastoidal breadth	8.4, 1	13.3 ± 0.13, 7 13.2 - 13.6	17.4 ± 0.35, 8 16.9 - 17.9
Length of mandibular toothrow		11.3 ± 0.21, 6 11.1 - 11.6	12.6 ± 0.55, 8 12.1 - 13.9
Length of mandible		18.0 ± 0.26, 9 17.7 - 18.5	24.3 ± 0.21, 8 24.1 -24.7
C-C (width across canines)	3.4, 1	5.9 ± 0.28, 10 5.5 - 6.3	7.2 ± 0.27, 8 6.9 - 7.7
M-M (width across molars)		8.9 ± 0.20, 10 8.7 - 9.3	11.7 ± 0.22, 8 11.3 - 11.9

a cave in Paraguay, where they occurred with *Carollia perspicillata*; one female *M. macrophyllum* showed evidence of recent lactation.

Fornes et al. (1969) provided the only data for this species in Argentina. They recorded remains of chitin on the inner side of the uropatagia of specimens collected in Cueva María Antonia, a few meters from the Paraná River. The cave had two entrances, a narrow one used by a colony of about 150 *Desmodus rotundus*, and a wider one in which two specimens of *Macrophyllum* and one *Carollia* were captured.

Harrison (1975) reported that a 17.5 mm fetus already had the distinctive nodules on the uropatagium present. Wilson (1979) captured pregnant females in October in El Salvador, in March, May, and August in Costa Rica, and in October and November in French Guiana.

Specimens Examined (1).—MISIONES: Cueva María Antonia, 1 (MACN).

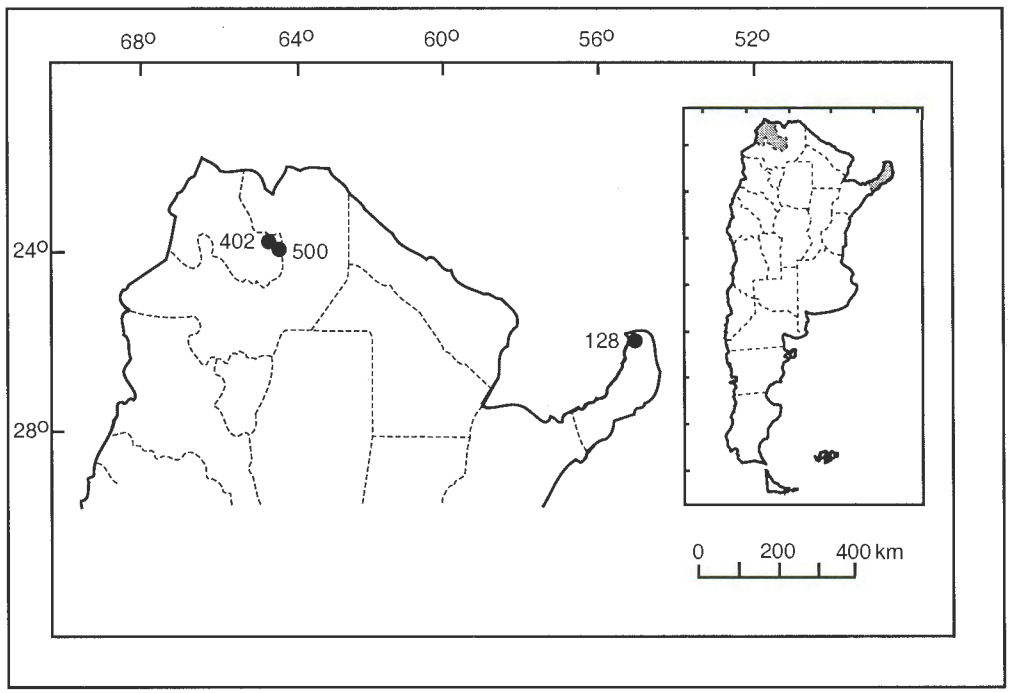


Figure 15. Map of the localities of *Tonatia bidens*.

Genus *Tonatia*
Tonatia bidens (Spix)

Vampyrus bidens Spix, Simiarum et Vespertilionum Brasiliensium species novae ou histoire naturelle des especies nouvelles de singes et de chauve-souris observées et recueillies pendant le voyage dans l'intérieur du Bresil execute par ordre de S. M. le Roi de Baviere dans les annees 1817, 1818, 1819, 1820. Francisci Seraphici Hübschmanni, Monachii, p. 65, 1823.

Tonatia bidens: Gray, A synopsis of the species of the Class Mammalia, as arranged with reference to their organization, by Cuvier, and other naturalists, with specific characters, synonyma, &c &c, vol. 5, *in* The animal kingdom arranged in conformity with its organization, by the Baron Cuvier, with additional descriptions of all the species hitherto named, and of many not before noticed. (E. Griffith, C. H. Smith, and E. Pidgeon, eds.). G. B. Whittaker, London, p. 69, 1827.

Type Locality.— Brazil, Bahía, Rio San Francisco.

Distribution.— Williams et al. (1995) separated *T. bidens*, which they described as a monotypic species, from *T. saurophila*, which was separated into three subspecies. The range of *T. bidens* extends from northeastern Brazil through Paraguay, eastern Bolivia, and northern Argentina.

Distribution in Argentina (Fig. 15).— *Tonatia silvicola* was cited previously for Palma Sola, Jujuy Province (Fornes et al., 1967) and Cataratas del Iguazú, Misiones Province (Villa-R. and Villa-C., 1971). However, these specimens were *T. bidens* and were the first reported for Argentina (Barquez et al., 1993).

Description (Figs. 16a, 16b, 16c, and 17).— In general, this species resembles *T. silvicola* (Figs. 16d and 18). Diagnostic characteristics are: the ears are completely separated; the size of the skull is generally larger than *T. silvicola* (smaller than *T. saurophila*); the breadth of the postorbital constriction is much larger than in *T. silvicola*; the ratio of the greatest length of the skull and the postorbital constriction is less than 5.5 in *T. bidens* and greater than 5.9 in *T. silvicola*. The tail protrudes dorsally from the middle of the uropatagium. The general color pattern of the pelage is grayish brown, with paler ashy gray on the sides of the neck, on the shoulders, and on the venter. The hair of the venter is usually darker basally, although this is difficult to see because of the pale tips. The proximal one-half of the forearm is furred dorsally and ventrally, differentiating this species from specimens of *T. silvicola* examined

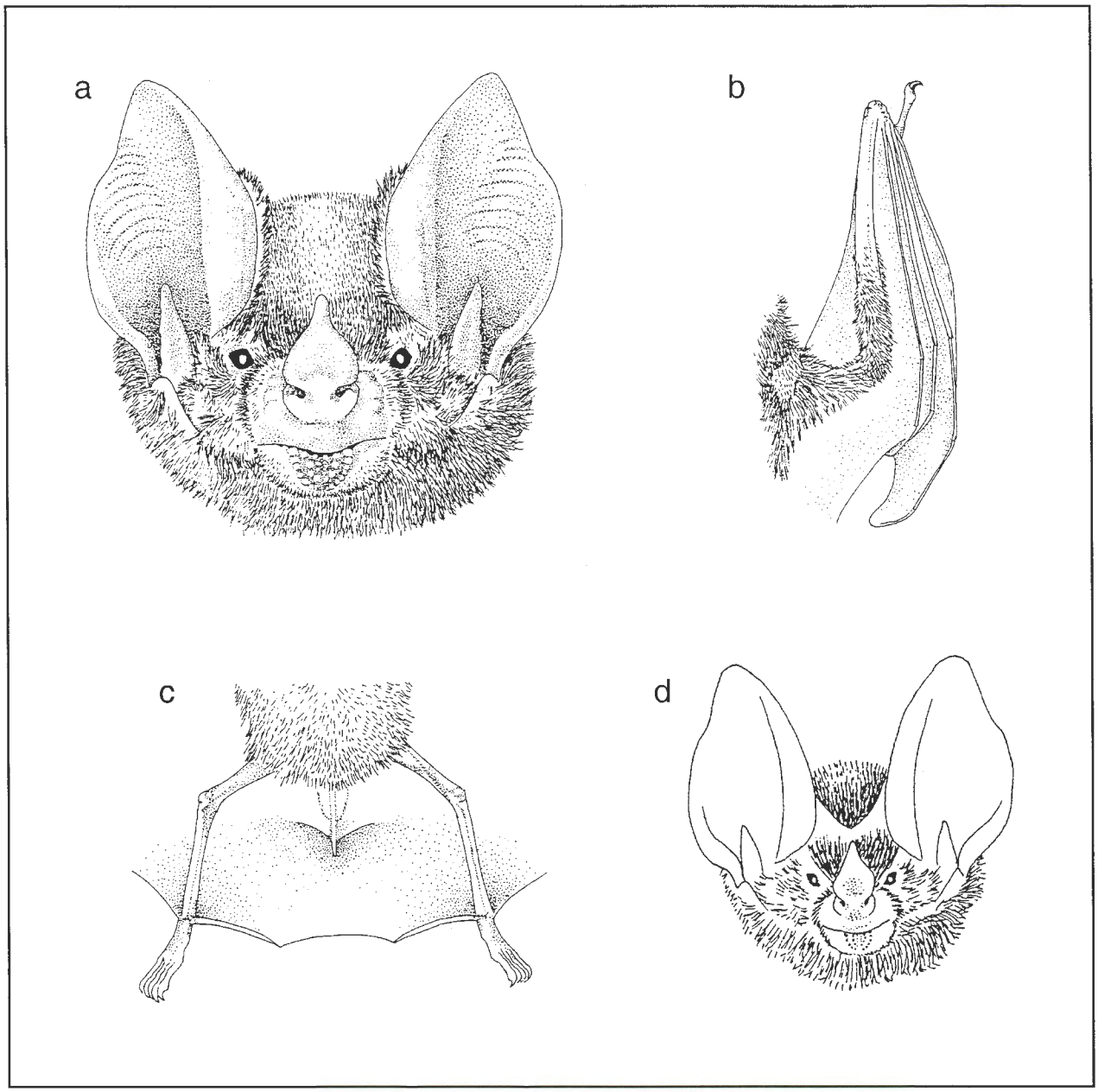


Figure 16. *Tonatia bidens* (a, b, and c) and *Tonatia silvicola* (d): (a) face; (b) forearm; (c) uropatagium (dorsal view); and (d) face.

from Bolivia, which were less furred on the forearm. The membranes generally are naked except for a small strip at the outer edge of the plagiopatagium. The ears are large and rounded, although smaller than in *T. silvicola*, and do not extend beyond the nose when laid forward. The inner edges of the proximal one-half of the ears are trimmed with white or pale gray hairs. The nose leaf is broad at the base and narrows abruptly from the middle to the tip; the tip is not sharply pointed. The upper lip is smooth and lacks warts; the lower lip has a central wart surrounded by smaller ones. The tragus is well developed; the antitragus is noticeably smaller than in *T. silvicola*. The uropatagium is broad and supported by calcars, which are smaller and weaker than in *T. silvicola*.

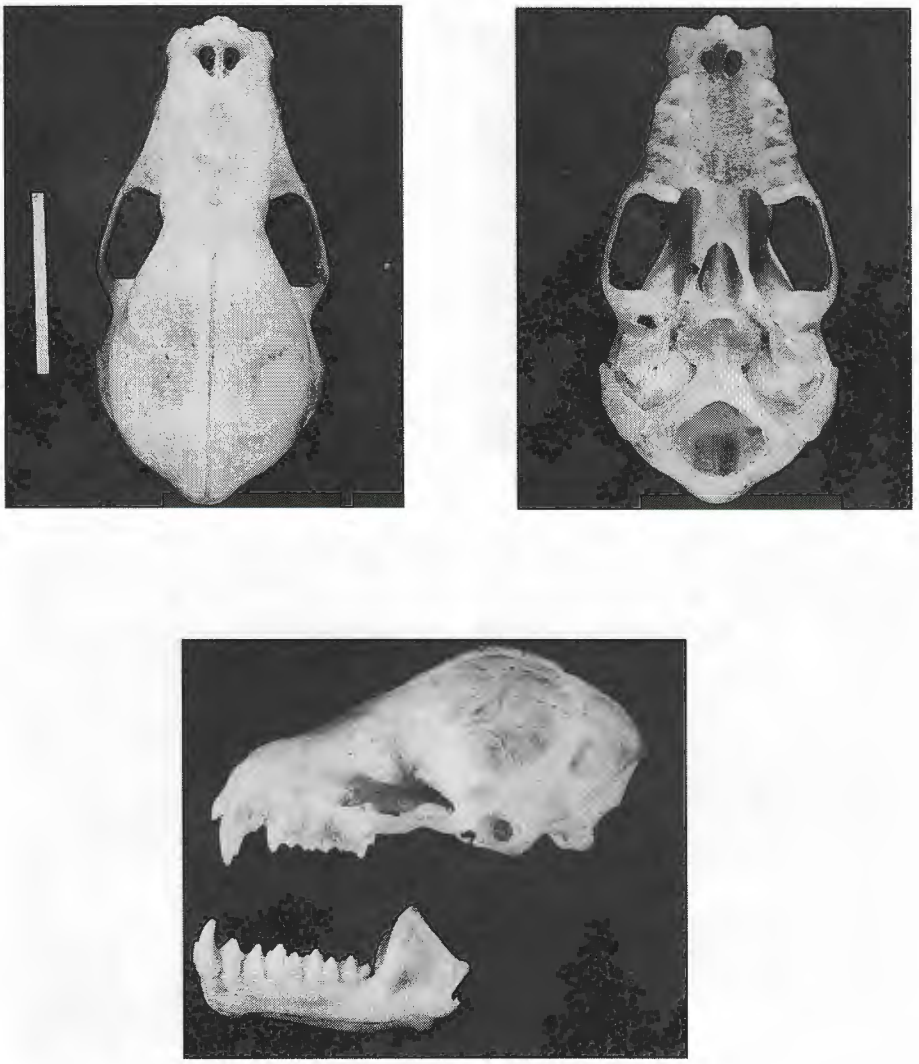


Figure 17. Skull of *Tonatia bidens*. Adult male from Laguna La Brea, Jujuy Province (OMNH 18788). Bar = 1 cm.

The braincase is broad and the postorbital constriction subtle in comparison with *T. silvicola*. The zygomatic arches are slender, although they appear broad in lateral view and show a medial constriction. The lambdoid and sagittal crests are poorly developed. Tympanic bullae are small, barely covering the middle of the cochlea. The mastoid processes are well developed. In lateral view, the rostrum shows a pronounced slope from the braincase to the top of the nasal opening.

The dental formula is I 2/1, C 1/1, P 2/3, M 3/3, total 32. The inner incisors are well developed, in contact with the each other, and slightly procumbent and concave anteriorly, appearing grooved. The I2 is tiny and placed within the cingulum of the canine. The upper canines are slightly recurved. The P1 is small and touching the canine; it is triangular in shape in lateral view; the anterior edge fits completely in the canine cingulum. The P2 is the highest tooth in the row. The M1 and M2 are square-shaped, the cusps are well developed, and all have the W-shape characteristic of the subfamily. The M3 is reduced and only two commissures are distinguishable with the parastyle better de-

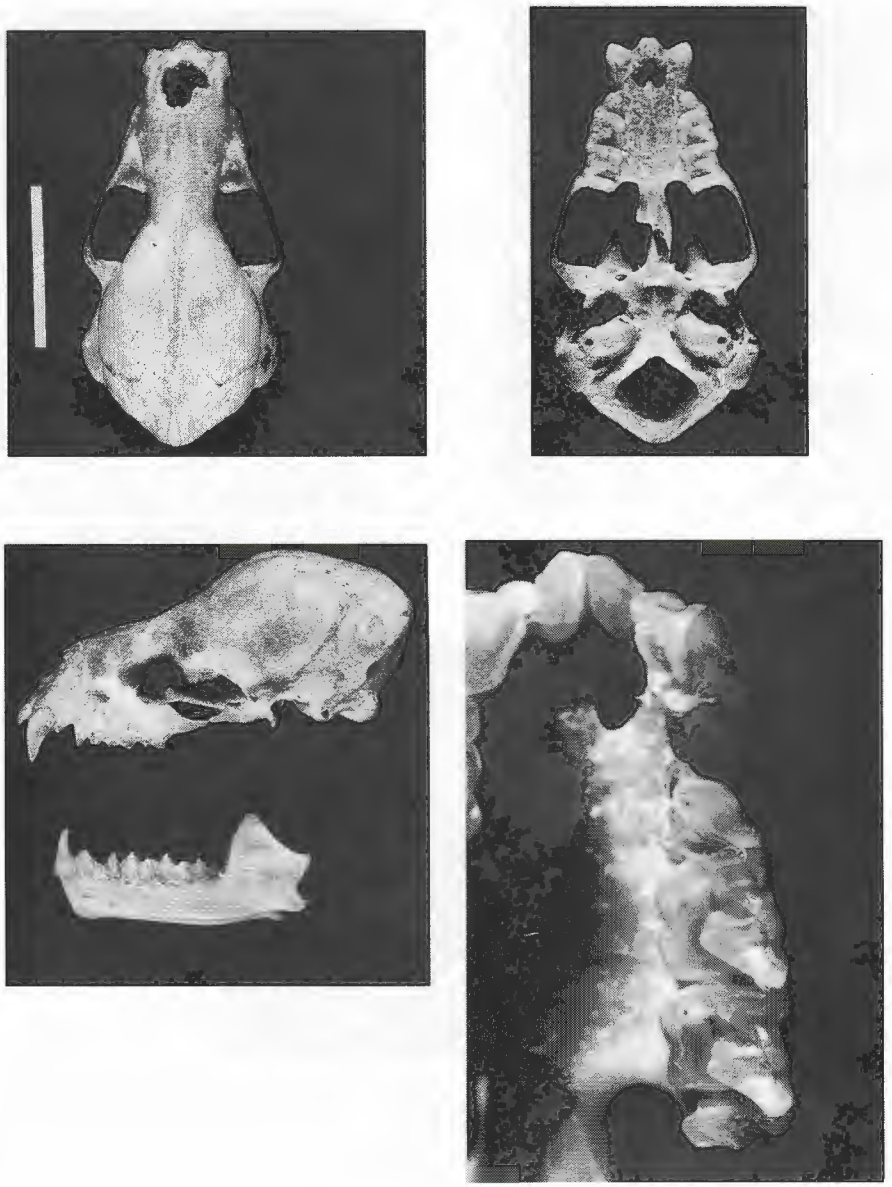


Figure 18. Skull and teeth of *Tonatia silvicola*. Adult female from Santa Cruz de la Sierra, Bolivia (CML 1476). Bar = 1 cm. Teeth not to scale.

veloped than in the other molariform teeth. In the lower toothrow, i1 is well developed, higher than it is wide, and has smooth edges. The canines are in contact witheach other behind the incisors. Both p1 and p3 are laterally compressed and unicuspidate; p2 is minuscule and usually displaced to the labial side except in one specimen in which it was displaced to the lingual side. The fourth commissure of m3 is reduced in comparison with the other molars.

Measurements.— Table 2.

Comments.— Very little is known about the feeding habits of this species. According to Gardner (1977*a*), fruits and insects are its main food. Humphrey et al.

(1983) reported a diet of insects, mainly Coleoptera and Homoptera, a lesser proportion of Araneidae and Lepidoptera; he also found a trace (0.7%) of vertebrates. Myers and Wetzel (1983) found insect chitin and fruit pulp in the stomachs of Paraguayan specimens. Observations of carnivorous feeding in this species have been rare and it is considered to be primarily a leaf-insect feeder. However, the stomach of a specimen caught in Laguna La Brea, Jujuy Province, was filled with down feathers, indicating the consumption of a young bird.

The reproductive cycle is poorly known. Breeding may occur more than once a year (Wilson, 1979), since pregnant females were recorded in January (Costa Rica), February (Guatemala), May (Trinidad), July (Peru), and August (Honduras). Young were reported in August in Honduras and Costa Rica. A specimen from Laguna La Brea, a male with well-developed scrotal testes, was collected in mid-June (winter). Gardner (1976) reported pregnant females from Peru at the end of July, but no reproductive activity in April.

Specimens Examined (13).— JUJUY: Laguna La Brea, 8 (6 MACN, 1 OMNH, 1 ROM); Palma Sola, Mina de Azufre, 4 (3 ROM, 1 TCWC). MISIONES: Cataratas del Iguazú, 125 m, 1 (IBUNAM).

Genus *Chrotopterus*
Chrotopterus auritus (Peters)

Vampyrus auritus Peters, Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, p. 415, 1856.

Chrotopterus auritus: Peters, Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, p. 505, 1865.

Type Locality.— Mexico (Oaxaca or Veracruz, see Medellin, 1989, and Carter and Dolan, 1978, for discussion of type locality).

Distribution.— Three subspecies are recognized: *C. a. auritus*, distributed from Mexico to northernmost South America; *C. a. guaianae* from Venezuela, the Guianas, and northern Brazil; and *C. a. australis*, from east-central Peru, southern Brazil, Paraguay, Bolivia, and northern Argentina.

Thomas (1905) reported specimens from Guyana and southern Brazil, distinguishing between two subspecies, *guaianae* and *australis*, but some authors have questioned the existence of geographic races (Handley, 1966). We found no subspecific differences in specimens collected throughout the range; however, a larger sample size is required to solve this problem. Until a revision is conducted, we retain Thomas' (1905) listing for the Argentine subspecies.

Chrotopterus auritus australis Thomas

Chrotopterus auritus australis Thomas, Annals and Magazine of Natural History, ser. 7, 16:308, 1905.

Type Locality.— Paraguay, Concepción, 300 m.

Distribution in Argentina.— Figure 19.

Description (Figs. 20 and 21).— This is one of the largest bats in Argentina, with the forearm measuring from 80 to 83 mm in the specimens examined (other specimens have been reported to range from 78 to 84 mm). The ears are large and separated from each other. The nose leaf is long and thick, its basal margin free of the muzzle. The tragus is small compared to the ears, is lanceolate in shape and has a pointed tip; the antitragus is reduced. The upper lip is smooth. The lower lip has a wart in the middle, a smaller one on each side, and a small groove on its anterior surface. The wing membranes are broad and well developed; the plagiopatagium is attached to the base of the foot at the proximal end of the toes. The uropatagium is long, reaching the base of the feet and is supported by well-developed calcars. The tail is tiny and enclosed in the uropatagium. The fur is long and fine, and extends over the wing membranes to the middle of the forearm, both dorsally and ventrally; a brush of hair is present at the base of the thumb. Color is blackish brown above and grayish below. The membranes are dark and the wing tips are white; the propatagium is somewhat transparent, and is paler than the other membranes.

The braincase is robust and elevated, with a well-developed sagittal crest. A lambdoidal crest is less developed but clearly visible. The postorbital constriction is apparent, marking a sharp division between the braincase and the broad rostrum. The zygomatic arches are thin (although broad in lateral view); viewed laterally they expand dorsally, and especially posteriorly. The mastoid processes are heavy. The basilar pits are shallow and the tympanic bullae are small.

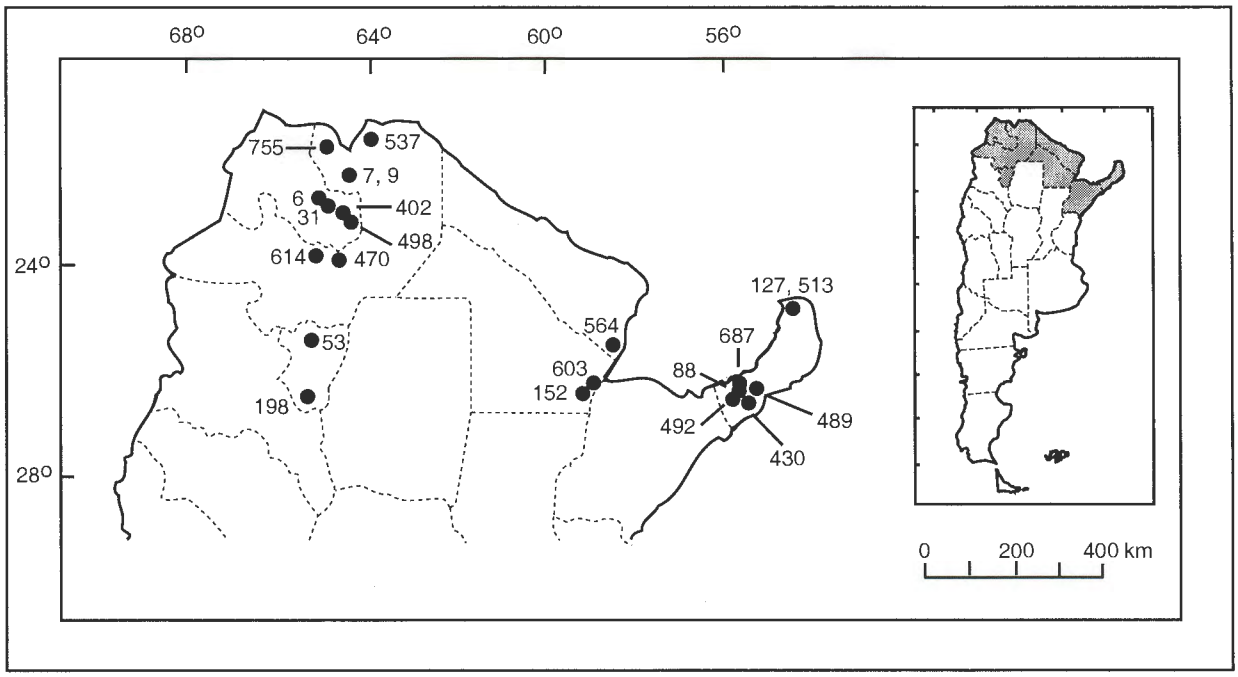


Figure 19. Map of the localities of *Chrotopterus auritus*.

The dental formula is I 2/1, C 1/1, P 2/3, M 3/3, total 32. The I1 is larger than the I2, the latter is reduced in size and resembles *Tonatia bidens*. The P1 is small, slightly displaced to the labial side, low and, although scarcely in contact with the canine, fills the gap between the canines and the premolars. The molars are similar to those of *Tonatia*, but noticeably more robust. The cusps are well developed, although the protocone is relatively low in comparison with the other cusps. The i1 is small; it is displaced anteriorly in some specimens, thus permitting the canines to be close to each other. The p1 is slightly triangular and lower than p3. The p2 is tiny and lies between p1 and p3, displaced somewhat to the lingual side and not visible from the labial side of the mandible because p1 and p3 are close together. The lower molars are narrower and have noticeably higher cusps than the upper ones.

Measurements.— Table 2.

Comments.— In Argentina the species occurs primarily in moist forests up to 1700 m. In forested areas abutting savannas, it will not be caught in the open savanna (Delpietro et al., 1992). It is difficult to capture because of its ability to avoid nets (see also Delpietro et al., 1992), and has often been considered to be rare (e.g., Brosset and Charles-Dominique, 1990), although it has been observed to fly in small, apparently cohesive, flocks of males and females (Delpietro et al., 1992). We often have found birds and bats (especially *Sturnira lilium*) hanging in bat nets with their heads eaten, although this species was not observed to feed on netted bats in Corrientes Province (Delpietro et al., 1992). The height above the ground at which they were entangled suggests predation by *Chrotopterus*. Park guards from Iguazú National Park report that *Chrotopterus* is common in the area and they observed one holding a mouse (*Oligoryzomys*) in its mouth; the bat had bitten the skull of the rodent. Olrog (1973) examined stomachs of *Chrotopterus* collected in Salta and Jujuy and found flesh, bones, feathers, and remains of a *Marmosa* (=*Thylamys*). Villa-R. and Villa-C. (1971) collected five individuals in Salta Province 40 m into a mine, where hair and skeletal remains of mammals, probably *Ctenomys*, were scattered on the floor. Barquez and Guerrero (1985) reported the remains of Cuterebridae larvae (a common ectoparasite of mammals) in the gut of a specimen from Salta. Gardner (1977*a*) reported the species feeding on insects and fruits, but Sazima (1978)

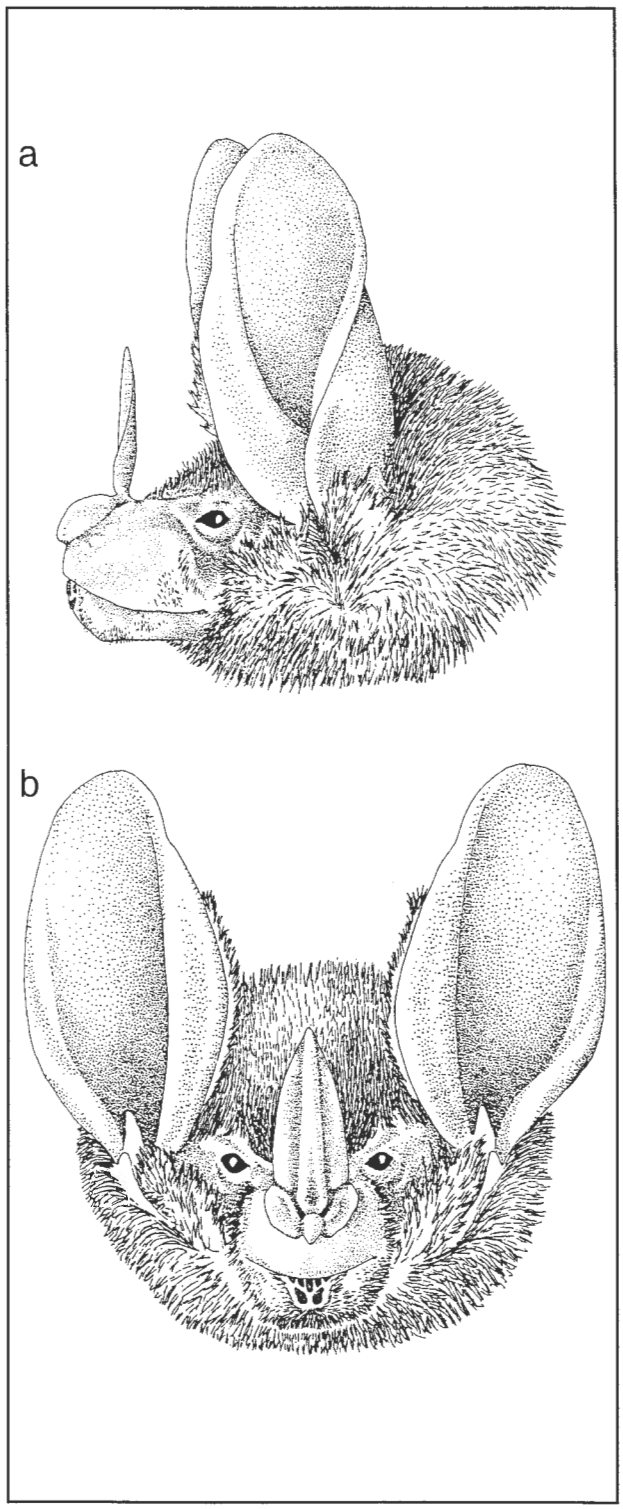


Figure 20. *Chrotopterus auritus:* (a) face (lateral view) and (b) face (frontal view).

suggested they were carnivorous. Tuttle (1967) found remains of reptiles (*Thecadactylus rapidicaudus*) in the stomach of a specimen from Venezuela. This species survives at least up to 4 years in the wild (Delpietro et al., 1992).

Little is known about reproduction in this species in Argentina, although a lactating female was captured in Corrientes Province in December (Delpietro et al., 1992). In Salta Province, a female with a fetus (crown-rump length = 35 mm) was collected in October, as were reproductively active males in November. Villa-R. and Villa-C. (1969) observed reproductively active animals in late July (winter) in Salta, recording a pregnant female with a fetus in the early stages of development, and males with scrotal testes. Crespo (1982) also reported reproductive activity in November (late spring) in Misiones Province.

Specimens Examined (21).— JUJUY: Abra de Cañas, El Monolito, 1700 m, 1 (CML); Aguas Negras, Parque Nacional Calilegua, 1 (CML); Laguna La Brea, 3 (1 MACN, 2 MD); Palma Sola, 1 (ROM). MISIONES: Arroyo Urugua-í, 1 (MACN); Bonpland, 1 (MACN); Estancia San Jorge, 2 (MACN); Leandro N. Alem, 1 (MACN); Oberá, 1 (MACN); Olegario V. Andrade, 2 (TCWC); Santa Ana, 1 (MACN). SALTA: Abra Grande, 20 km NW Orán, 1 (CML); Piquirenda Viejo, 6 km W, 1 (OMNH); Vado de Arrazayal, 20 km NW Aguas Blancas, 2 (CML). TUCUMÁN: Arroyo Aguas Chiquitas, Reserva Provincial Aguas Chiquitas, 1 (CML); Dique San Ignacio, 1 (CML).

Additional Records.— CHACO: Colonia Benítez (Cabrera, 1938); Río Guaycurú (Cabrera, 1938). CORRIENTES: Noreste de Corrientes (H. A. Delpietro et al., 1992). FORMOSA: Puerto Vélaz (Cabrera, 1938). MISIONES: Arroyo Urugua-í (Massoia et al., 1987); Cataratas del Iguazú (Crespo, 1982); Departamento Cainguás (Massoia, 1980); Parque Nacional Iguazú (S. Somay, personal communication). SALTA: Abra Grande (Olrog, 1976); Mina Pablo, Unchimé, 25 km E General Güemes, 1100 m (Villa-R. and Villa-C., 1971); Río Mojotoro, 5 km N Salta (Villa-R. and Villa-C., 1971).

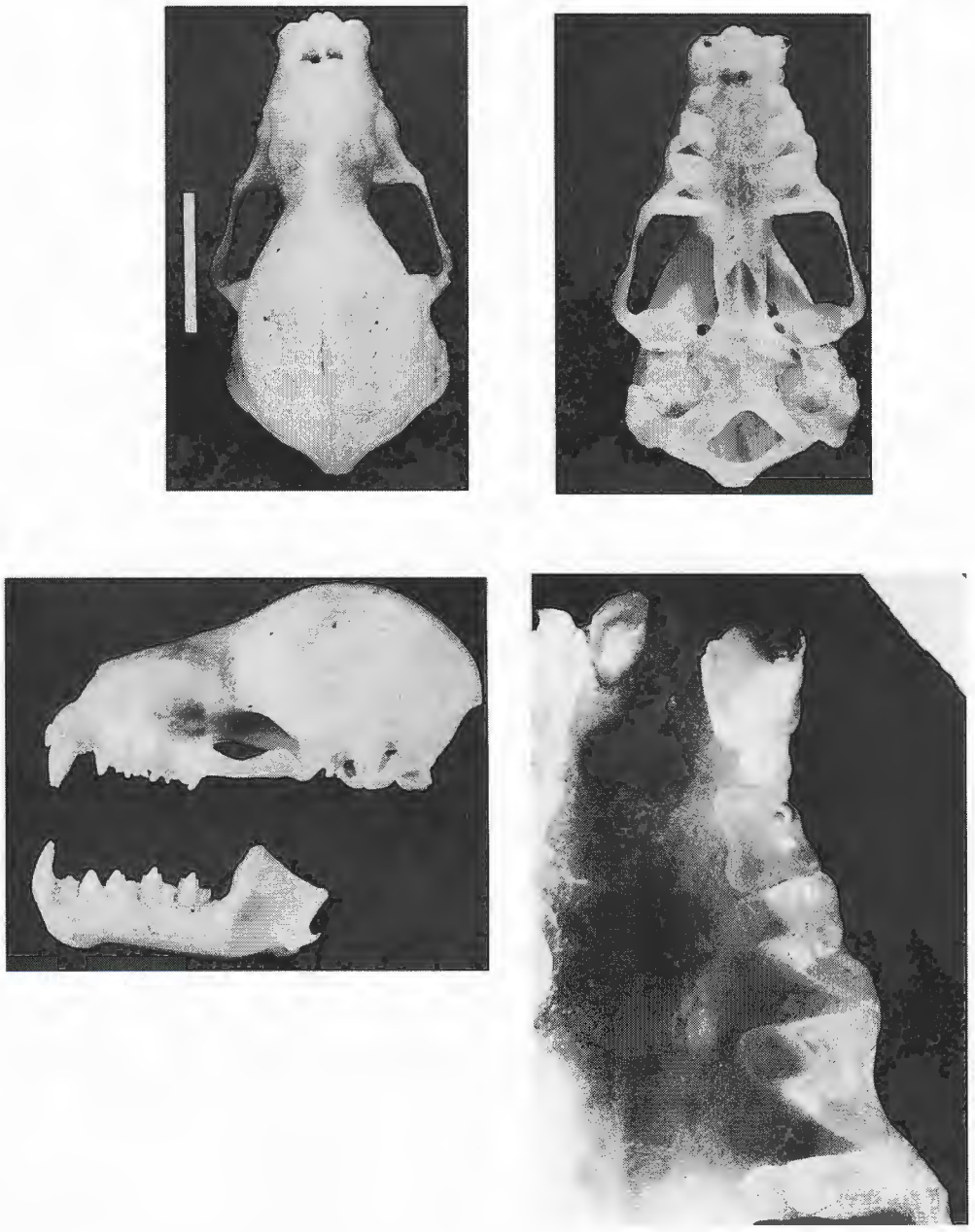


Figure 21. Skull and teeth of *Chrotopterus auritus*. Adult female from Abra Grande, 20 km NW Orán, Salta Province (CML 1778). Bar = 1 cm. Teeth not to scale.

SUBFAMILY GLOSSOPHAGINAE

Two species, *Glossophaga soricina* and *Anoura caudifer*, occur in Argentina. *Anoura geoffroyi* was reported erroneously for the country; previous citations are all *A. caudifer* (Barquez et al., 1993). The main characteristics of this subfamily are the remarkably elongated muzzle and tongue, which are adapted for feeding on nectar. Body size is small and the general appearance is rather fragile. Molars have W-shaped commissures, but these are less pronounced than in members of the Subfamily Phyllostominae. A trend toward less robust teeth is evident; lower incisors are absent in *Anoura*. The zygomatic arches are poorly developed and sometimes absent in *A. caudifer*, but are always present in *G. soricina*. The nose leaf is small and clearly evident, but never as well developed as in the subfamilies Phyllostominae, Stenodermatinae, or Carolliinae.

KEY TO THE SPECIES

1. Uropatagium well developed and broad; tail minute and appearing on the dorsal surface of the uropatagium; incisors 2/2 ..... *Glossophaga soricina*

1'. Uropatagium reduced, obsolete, or absent; tail small or absent, when present not appearing on the dorsal surface of the uropatagium; incisors 2/0 2

2 (1'). Uropatagium not visible; inner margins of legs and rump covered with hairs; tail and calcar absent (probably present in Argentina) ..... *Anoura geoffroyi*

2'. Uropatagium small but visible, semicircular in shape, and with a fringe of hairs on its trailing edge; tail very short, reaching the free margin of the uropatagium; calcar about one-half as long as the foot ..... *Anoura caudifer*

Genus *Glossophaga*

Only one species, *Glossophaga soricina*, has been recorded for Argentina. Four subspecies were listed by Jones and Carter (1976), but Webster and Jones (1980) listed five subspecies: *G. s. antillarum* from Jamaica (uncertain in the Bahamas); *G. s. handleyi*, from Mexico and Central America, with the type being from the Yucatan Peninsula; *G. s. mutica*, occurring on the Tres Marías Islands, Mexico; *G. s. soricina*, which occurs in most of South America, including Argentina; and *G. s. valens* in western Ecuador and Peru.

Glossophaga soricina (Pallas)

Vespertilio soricinus Pallas, Miscellanea zoologica, quibus nov imprimis atque obscur animalium species describuntur et observationibus i conibusque illustrantur. Hagae Comitum, apud Petrum van Cleef, p. 48, 1766.

Glossophaga soricina: É. Geoffroy St.-Hilaire, Mémoires du Muséum d'Histoire Naturelle, Paris, 4:418, 1818.

Type Locality.— Restricted to Suriname by Miller (1912), although Pallas gave the distribution as Suriname and the Caribbean (Cabrera, 1958; Husson, 1962). The type specimen is probably lost (Miller, 1913*a*).

Distribution.— The species is found from Mexico and the Caribbean to Colombia, Venezuela, the Guianas, Suriname, Peru, Bolivia, Brazil, Paraguay, and Argentina.

Distribution in Argentina (Fig. 22).— According to Cabrera (1930), this species inhabits the subtropical forests of Argentina southward to the Río de La Plata. He noted that the Museo de Ciencias Naturales de La Plata had a specimen from La Plata and the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" in Buenos Aires had specimens from the Capital Federal and from Misiones Province. The species was reported to occur in Resistencia, Chaco (Podtiaguin, 1944), apparently based on data from Dernier Veizel, although Podtiaguin did not provide a reference. Barquez (1985) included the species in northwestern Argentina. He suggested that Cabrera's (1930) hypothesis of a more southeasterly distribution was not documented sufficiently, since most of the referenced specimens apparently have been lost. However, after an intensive search in the Museo de Ciencias Naturales de La Plata, two specimens (without skulls) were found preserved in alcohol and are likely those to which Cabrera referred. The specimens from the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" in Buenos Aires are still missing. During the early part of this century, the distribution of the

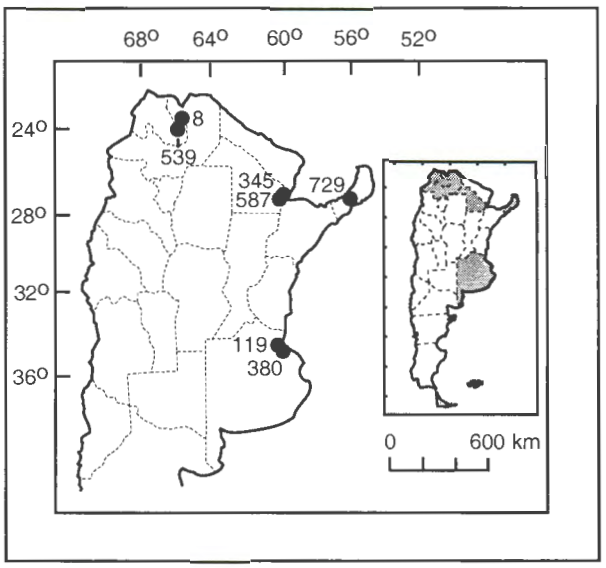


Figure 22. Map of the localities of *Glossophaga soricina*.

species may have extended further south along the gallery forests of coastal rivers. Today this habitat largely has disappeared and the present range of this bat is unknown.

Description (Figs. 23 and 24).— Body size is small, the forearm ranging from 36 to 37.7 mm in Argentine specimens. Specimens from Salta Province are slightly larger than those from Bolivia and other parts of South America, according to measurements given by Miller (1913*a*), Husson (1962), and Taddei (1975). The muzzle is elongated, but not as much as *Anoura*, and the tongue is long and extensible. The nose leaf is small, has a broadened base, and is sharply pointed. The upper lip is smooth and the lower lip has a V-shaped groove bordered by small warts. The ears are short and rounded. The tragus is long compared to the ears, lanceolate, and pointed; the antitragus is hardly visible. Wing membranes are broad. The plagiopatagium is attached to the base of the tibia; the propatagium is broad. The uropatagium is well developed and is a useful character to distinguish this species from *Anoura*, which has the uropatagium reduced or absent. The tail is tiny, but visible, and protrudes slightly through the dorsal surface of the uropatagium, which is supported by thin calcars. The fur is dense and soft. Dorsal color of the pelage is brownish (some specimens grayish) and the venter is paler; hairs are bicolored, pale gray basally and darker at the tip; neck hairs are paler. Membranes are, in general, dark, although the dactylopatagium is paler, and the uropatagium is slightly transparent. Feet are small; the thumb is elongated and laterally flattened.

The skull is delicate in appearance, with an elongated rostrum and a globose braincase. The postorbital constriction is indistinct and the rostrum is narrower than the braincase. The basisphenoid pits are deep but only slightly pronounced; the palate extends beyond the last upper molar. A sagittal crest is lacking; lambdoid crests are slightly visible. Tympanic bullae are delicate, scarcely covering one-half of the cochlea. The zygomatic arches are complete but weak.

The dental formula is I 2/2, C 1/1, P 2/3, M 3/3, total 34. The I1 and I2 are strongly procumbent, not completely filling the space between the canines, and are wider than long. The I2 is shorter than I1. The space between I2 and the canine is slightly smaller than the width of the incisor. Canines are long and very sharp, with a groove that runs along the length of the internal face; the base is wide and the cingulum is poorly developed. The premolars are laterally flattened and appear triangular in lateral view. The P1 is slightly smaller than P2 and completely separated from P2 and from the canine by a small gap. The P2 also is separated from M1. In specimens from Bolivia these spaces are not apparent. The molars have a strong central depression between the internal cusps, the "W" pattern, and the protocone. The "W" pattern is distorted, mainly by the reduction of the external cusps, parastyle, mesostyle, and metastyle, although these are present. The hypocone is absent. The M3 is smaller and more triangular than the other molars. In lateral view the molars are lower than the premolars. The lower incisors are small, subequal in size, and rounded; when viewed dorsally they form a semicircle that does not completely fill the space between the canines. The p3 is laterally flattened, subequal in size, and triangular in lateral view. The p3 is separated from the p2 and the m1 by a small space on each side.

Measurements.— Table 3.

Comments.— The biology of *G. soricina* is reviewed by Alvarez et al. (1991), and there is a good deal of information on the biology of this species in Mexico in Ramírez-Pulido et al. (1993). *G. soricina* shows less morphological adaptation to nectar feeding than *Anoura*; its diet also includes a high proportion of

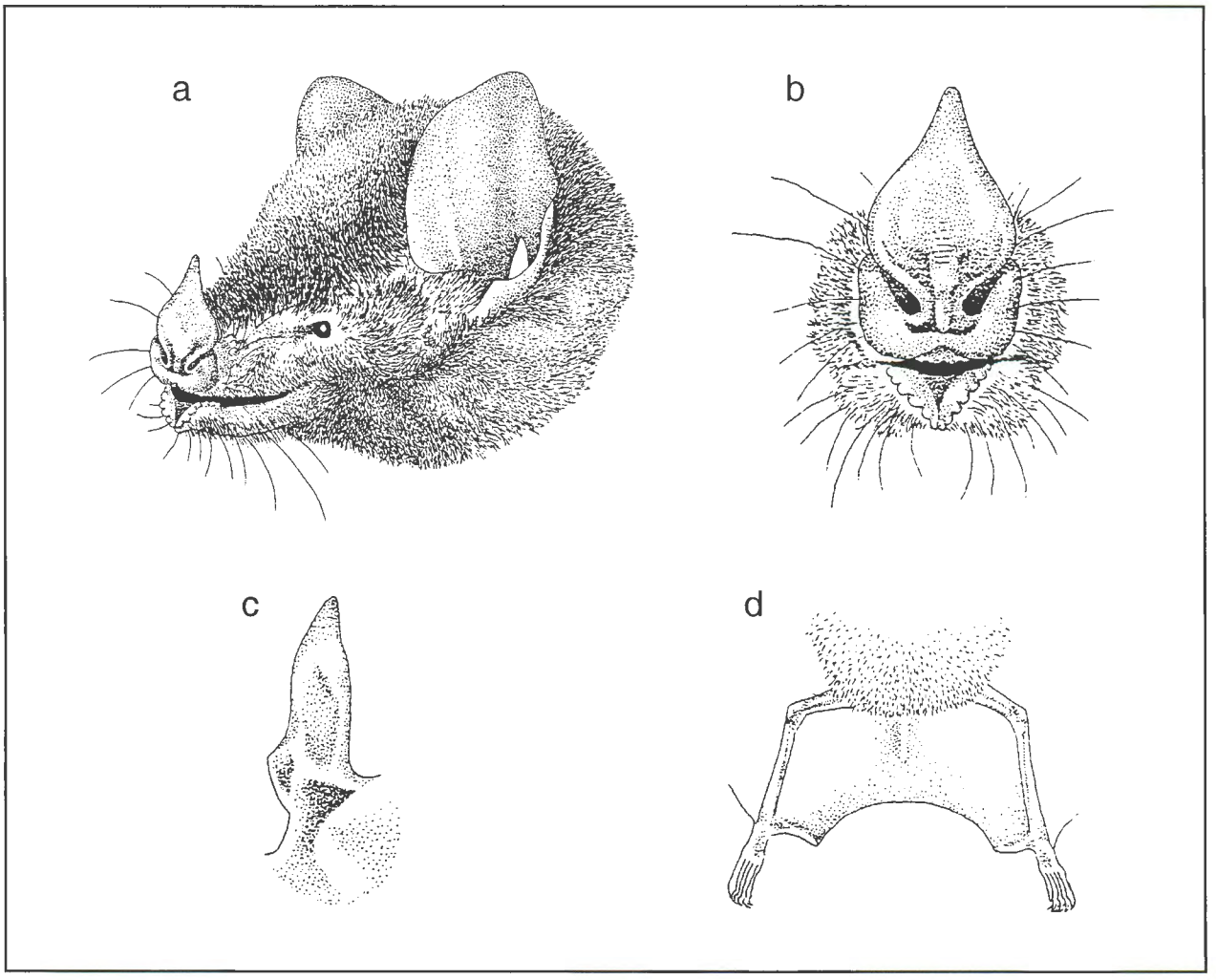


Figure 23. *Glossophaga soricina*: (a) face; (b) nose leaf; (c) tragus; and (d) uropatagium.

flowers, fruits, and insects. During the past century it was thought that their food consisted of blood; for example, Gray (1838) called it the "Soricine blood sucker." Howell (1974) indicated that this species fed on nectar and pollen from April to June, and that in 95% of the cases where insects were found in stomachs or guano, these were the only item present, which led her to propose that the insects were taken by active pursuit rather than ingested in association with plant material. Alvarez and Gonzalez Quintero (1970) analyzed the stomach contents of *Glossophaga* from Mexico and found pollen grains from 34 species of plants. Sazima et al. (1982) noted that this species fed at *Luehea speciosa* (Tiliaceae) in November in the Brazilian cerrado, and was an effective pollinator of that plant. A large quantity of unidentifiable vegetable matter (primarily flower parts), as well as chitin, insect hairs, and two complete insects of the Order Thysanoptera (Terebrantia) were found in the stomach of the specimen from Salta Province (R. M. Barquez, personal observation). These small (1.0 and 1.5 mm) insects probably had been ingested with flower parts, but the chitinous remains were notably larger than the thysanopterans, which would indicate the capture and chewing of larger prey.

Glossophaga soricina generally uses caves, bridges, and culverts as diurnal refuges, but can also be found in houses, tree holes, and abandoned buildings (e.g., Brosset and Charles-Dominique, 1990). The specimen from Salta Province was captured in a mist net placed at the entrance of a cavelike cavity formed by the settling of one of the sides of a bridge over the slope

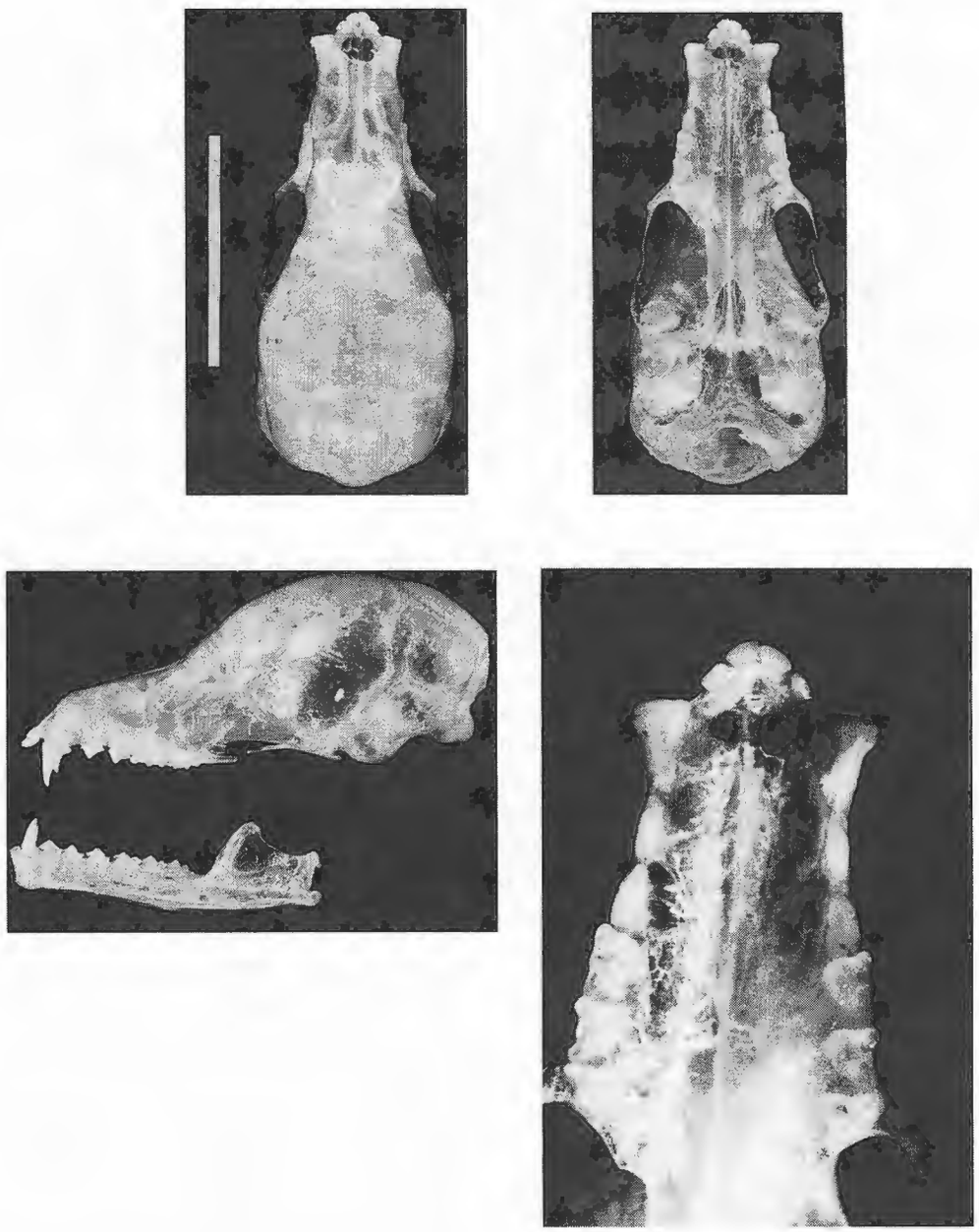


Figure 24. Skull and teeth of *Glossophaga soricina*. Adult male from Abra Grande, 10 km N Orán, Salta Province (CML 1342). Bar = 1 cm. Teeth not to scale.

of a deep natural ravine. The vegetation was degraded subtropical forest. In French Guiana, Brosset and Charles-Dominique (1990) also found this species to prefer degraded habitats, rather than undisturbed rain forest. *Myotis nigricans* also were found in the refuge. The *Glossophaga* were trapped on the outer side of the net, which would suggest their use of the refuge as a nocturnal shelter; no *Glossophaga* were seen in the shelter during the day. This species, which is very rare in Argentina, may be more common in other parts of its range; for example, Willig (1983) reported groups of more than 2,000 individuals in abandoned buildings in

Table 3. Measurements of Glossophaga soricina, Anoura caudifer, *and* Carollia perspicillata. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Glossophaga soricina*	*Anoura caudifer*	*Carollia perspicillata*
Total length	77.5 ± 10.54, 2 70.0 - 84.9	59.0 ± 2.57, 5 56.0 - 62.4	65.0, 1
Tail length	7.0 ± 0.14, 2 6.9 - 7.1	4.7 ± 0.35,2 4.5 - 5.0	9.0, 1
Hindfoot length	9.4, 1	9.2 ± 0.80, 5 8.0 - 10.0	9.0, 1
Ear length	15.9, 1	12.9 ± 2.19, 5 11.0 - 15.5	15.0, 1
Forearm length	37.4 ± 0.17, 3 37.2 - 37.5	38.1 ± 1.24, 5 36.0 - 39.0	42.6 ± 1.15, 3 42.0 - 44.0
Weight	10.3 ± 0.76, 3 9.5 - 11.0	10.4 ± 1.72, 3 8.5 - 11.8	
Condylobasal length	20.3, 1	22.1 ± 0.51, 5 21.7 - 23.0	19.0, 1
Least interorbital breadth	4.6, 1		5.4 ± 0.14, 2 5.3 - 5.5
Zygomatic breadth	9.0, 1	9.9 ± 0.42, 2 9.6 - 10.2	
Greatest length of skull	21.5, 1	22.9 ± 0.52, 5 22.7 - 23.9	21.3 ± 0.84, 2 20.7 - 21.9
Postorbital constriction		4.6 ± 0.21, 5 4.4 - 4.9	5.2 ± 0.25, 3 5.0 - 5.5
Breadth of braincase		9.0 ± 0.27, 5 8.8 - 9.4	9.3 ± 0.28, 2 9.1 - 9.5
Length of maxillary toothrow	7.3, 1	8.3 ± 0.16, 5 8.2 - 8.5	5.4 ± 0.14, 2 5.3 - 5.5
Palatal length	11.3, 1	11.8 ± 0.35, 5 11.5 - 12.4	
Mastoidal breadth		9.2 ± 0.14, 2 9.1 - 9.3	10.6 ± 0.49, 2 10.3 - 11.0
Length of mandibular toothrow		8.9 ± 0.21, 2 8.8 - 9.1	6.9 ± 0.28, 2 6.7 - 7.1
Length of mandible	14.3, 1	16.7 ± 0.49, 4 16.2 - 17.3	14.1 ± 0.63, 2 13.7 - 14.6
C-C (width across canines)		4.1 ± 0.19, 5 3.8 - 4.3	4.7 ± 0.21, 2 4.6 - 4.9
M-M (width across molars)		5.8 ± 0.19, 5 5.7 - 6.2	7.6 ± 0.21, 2 7.5 - 7.8

the Brazilian caatinga. This species is known to be preyed upon by Stygian owls (*Asio stygius*) in the cerrado savanna of Brazil (Motta Junior and Taddei, 1992).

Specimens Examined (4).— BUENOS AIRES: La Plata, 1 (MLP). JUJUY: Planta Caimancito, Parque Nacional Calilegua, 2 (CML). SALTA: Abra Grande, 10 km N Orán, 1 (CML).

Additional Records.— BUENOS AIRES: Capital Federal (Cabrera, 1930). CHACO: Isla del Cerrito (Fornes and Massoia, 1967); Resistencia (Podtiaguin, 1944). MISIONES: Misiones (Cabrera, 1930); Teyú Cuaré (Vaccaro and Massoia, 1988*a*).

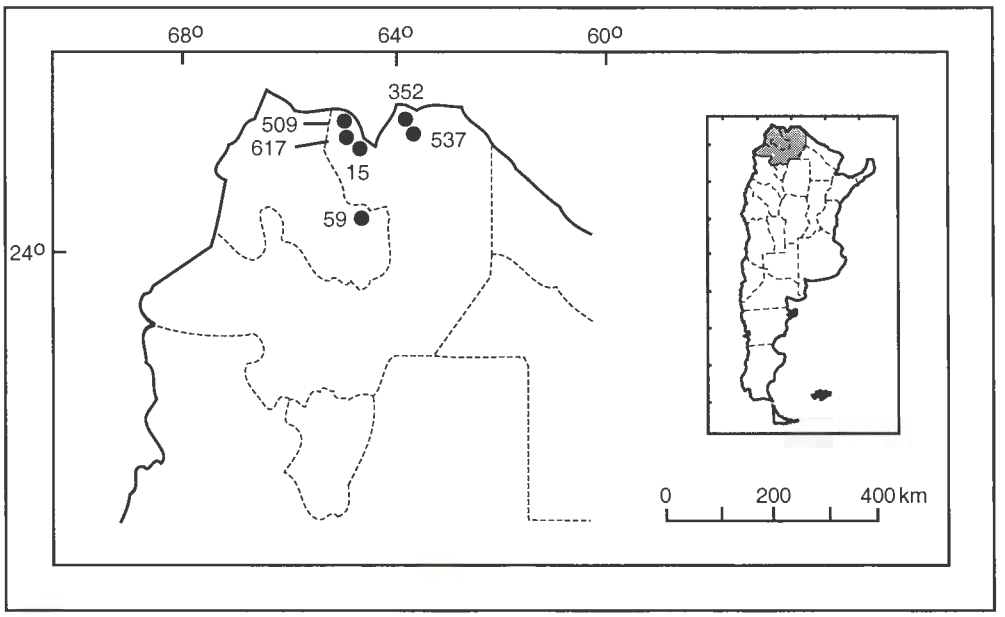


Figure 25. Map of the localities of *Anoura caudifer*.

Genus *Anoura*

Cabrera (1958) treated *A. caudifer* and *A. geoffroyi* as congeneric, emphasizing that the difference between them is the presence of a tail in *caudifer*. This character, however, could not be used in diagnosing the genus since it is so variable that it can be completely absent. Husson (1962) retained *caudifer* in *Lonchoglossa* and said that the zygomatic arches are slender, but definitely ossified. Later, Husson (1978) assigned *caudifer* to *Anoura*. Tamsitt and Valdivieso (1966) also treated this species as *Anoura*, mentioning the presence of the zygomatic arches.

Anoura caudifer (É. Geoffroy St.- Hilaire)

Glossophaga caudifer É. Geoffroy St.-Hilaire, Mémoires du Muséum d'Histoire Naturelle, Paris, 4:418, 1818.

Anoura caudifer: Cabrera, Revista del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," e Instituto Nacional de Investigación de las Ciencias Naturales, Ciencias Zoológicas, 4:74, 1958.

Sanborn (1933) considered this species to be in the Genus *Lonchoglossa*, differentiating it from *Anoura* primarily by the presence of a tail. He indicated that in *Lonchoglossa* the zygomatic arch is always present, whereas in *Anoura* it is generally lacking. Vieira (1942) also recognized *Lonchoglossa* as a genus in which the zygomatic arches, although weak, are present. In the only specimens known from Argentina, the arches are complete, but weak, and in one of them, from Piquirenda Viejo, they were found to be complete, but upon being cleaned with dermestid beetles, they disappeared. This also happens with the tail, which is clearly visible in living specimens, but absent in most museum skins.

Type Locality.— Brazil, Rio de Janeiro.

Distribution.— Two subspecies are recognized: *A. c. caudifer* from Colombia, Venezuela, the Guianas, Brazil, Bolivia, and Argentina; and *A. c. aequatoris* from Peru and Ecuador.

Distribution in Argentina (Fig. 25).— Specimens from Salta Province were misidentified as *A. geoffroyi* by Fornes (1972*a*), Olrog and Barquez (1979), and Barquez (1984*a*). Barquez and Olrog (1985) included *A. caudifer* in Argentina, but considered it the second species of the genus for the country since they were unaware that Fornes (1972*a*) had misidentified specimens. Mares et al. (1989) correctly listed *A. caudifer* for Salta Province. Only *A. caudifer* is known for the country (Barquez et al., 1993).

Description (Figs. 26 and 27).— The muzzle is elongated, longer than *G. soricina*, and the upper border at the height of the eyes is notably convex. The

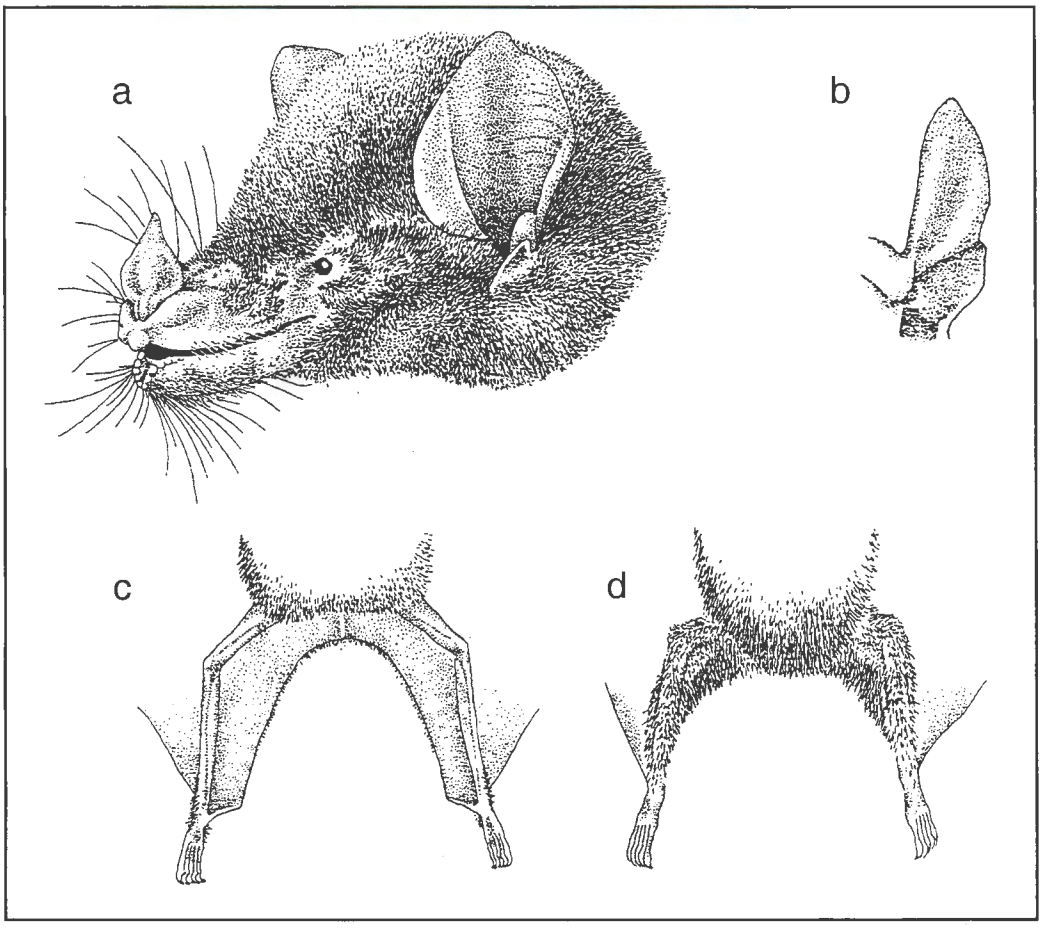


Figure 26. *Anoura caudifer*: (a) face; (b) tragus; and (c) uropatagium. *Anoura geoffroyi*: (d) uropatagium.

tongue is long and protractile. The nose leaf is small but well defined (more reduced than in *Glossophaga*), taller than wide, and attached to the upper lip. The upper lip is smooth, lacking wrinkles or papillae. The lower lip is divided medially by a deep furrow, with two thick callosities on each side. The ears are short, separated, and rounded; the antitragus is absent and the tragus is normal, short, and without crenulations. Pelage is dense and silky, extending along both the dorsal and ventral sides, over part of the plagiopatagium, propatagium, and one-half of the forearm. The uropatagium is semicircular and bordered by a fringe of sparse hairs (in *A. geoffroyi* it is absent). The calcar is small, slightly shorter than the length of the foot. The thumb is short and thin, and its nail is short. The tail is small, included in the uropatagium, and generally extends to its border. Color is generally dark brown; basally the dorsal hairs are gray and the ventral hairs are unicolored. Areas behind the ears, the back of the neck, and anterior one-half of the back, are paler or, in some specimens, reddish. Membranes are dark brown to black.

The skull is elongated, but the rostrum is less than the length of the braincase and is widened in the area of the canine. Postorbital constriction is insignificant. Zygomatic arches are thin and the middle portion is frequently cartilaginous in young individuals; in mature specimens the arches are ossified and complete. A sagittal crest is absent; a slight lambdoidal crest is present. Tympanic bullae are small. Basisphenoidal pits are present but shallow.

The dental formula is I 2/0, C 1/1, P 3/3, M 3/3, total 32. The I1 and I2 are small, paired, and separated by a wide space; I1 is smaller than I2. Premolars are laterally compressed and increase in size from the first to the third; P1 is reduced and separated from the canine and P2 by a small space; P2 is separated from P1 and P3; and P3 is in contact at its posterior border with

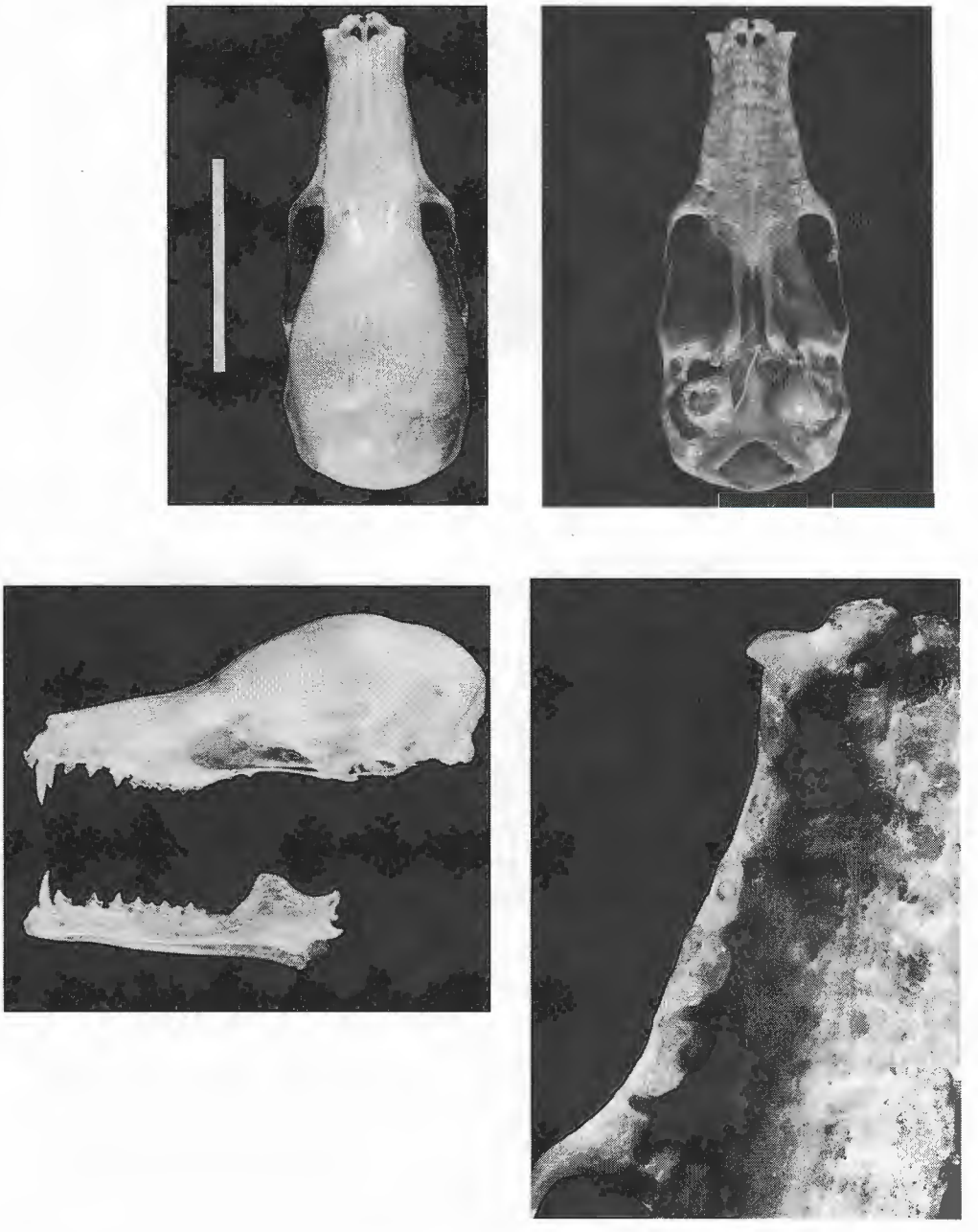


Figure 27. Skull and teeth of *Anoura caudifer*. Adult female from Río Pescado, Salta Province (OMNH 18683). Bar = 1 cm. Teeth not to scale.

M1. All premolars are triangular in lateral view except for P1; the central cusp is elevated and sharp, and the anterior and posterior cusps are smaller. The molars have a strong central depression similar to *Glossophaga*, although more laterally compressed. The absence of lower incisors, a diagnostic dental trait, provides a space through which the tongue extends during feeding. Lower premolars are thin; p1 is almost in contact with the canine, but separated from p2 by a small space. No gaps separate the remaining premolars and molars. The paraconid is much smaller than the rest of the cusps. The coronoid process of the mandible is not well de-

veloped, and is about the same height as the mandibular condyle.

Measurements.— Table 3.

Comments.— This species has been suggested to have an asynchronous reproductive cycle (Wilson, 1979). A juvenile captured in Itaú, Salta Province in October had deciduous teeth and was just beginning to fly. A second individual from nearby Piquirenda Viejo was slightly more developed in mid-November, but the last molars had not erupted completely. At about the same time, in Río Pescado, a pregnant female was found with a well-developed fetus. This species may have a long reproductive period in Argentina, with births occurring from September through November. In French Guiana, Brosset and Charles-Dominique (1990) found colonies that varied from a few to 100 individuals, many being nursing colonies, others being harems, and all in association with *Carollia perspicillata* and *Micronycteris microtis*.

Little information on diet is available; specimens we captured had empty stomachs. Gardner (1977*a*) reported this species feeding on fruits, nectar, pollen, and insects. Sazima (1976) captured this species (and *A. geoffroyi*) visiting flowers of *Bauhinia rufa* and found that the stomachs contained pollen, and fragments of insects of the orders Thysanoptera, Hymenoptera, Coleoptera, and Lepidoptera.

Only caves, tunnels, and tree holes are known shelters; in caves they live in association with other species such as *A. geoffroyi*, *A. cultrata*, *Carollia perspicillata*, *Carollia* sp., and *Pteronotus parnellii* (Lemke and Tamsitt, 1979). Brosset and Charles-Dominique (1990) reported it roosting in culverts in French Guiana in association with *Carollia perspicillata*. One specimen from Río Pescado was captured almost at ground level in a net located at the side of the Río Pescado in an open area along with several specimens of *Sturnira lilium*; the specimen from 6 km W Piquirenda Viejo was obtained over a stream with calm water along one end of a culvert located under a road in the forest.

Specimens Examined (8).— JUJUY: Arroyo Sauzalito, Parque Nacional Calilegua, 1 (CML). SALTA, Agua Blanca, 5 km W, 1 (MACN); Itaú (Campo Largo), Sierras de Tartagal, 1600 m, 1 (CML); Parque Nacional Baritú, naciente Arroyo Santelmita, 900 m, 1 (CML); Piquirenda Viejo, 6 km W, 1 (CML); Río Pescado, 3 (2 MACN, 1 OMNH).

SUBFAMILY CAROLLIINAE

Four species are known, but only one occurs in Argentina, *Carollia perspicillata*. This species is characterized by the lack of a zygomatic arch, upper molars without W-shaped commissures, and a shortened, rather than elongated, muzzle.

Genus *Carollia*
Carollia perspicillata (Linnaeus)

Vespertilio perspicillatus Linnaeus, Systema Naturae per regna tria naturae, secundum classis, ordines, genera, species cum characteribus, differentiis, synonymis, locis. Tenth ed. Laurentii Salvii, Stockholm, 1:31, 1758.

Carollia perspicillata: Miller, Bulletin of the United States National Museum, 128:53, 1942.

Type Locality.— Originally, Linnaeus (1758) indicated "America" as the type locality. Pine (1972) detailed the synonymy, mentioning that in 1911, Thomas was informed by Lönnberg that the type specimen of Linné from the Museo Adolphi Friderici had not existed for a long time. Consequently, Thomas (1911) suggested that "Surinam" be given as the restricted type locality, since the specimen collected by Seba probably came from that colony. This type locality is now commonly accepted. Carter and Dolan (1978) also discussed the designation of the holotype by Thomas.

Distribution.— Widely distributed from southern Mexico to northern Argentina. Two subspecies are currently recognized, *C. p. perspicillata*, over most of the range of the species, and *C. p. azteca* in Central America and adjacent northern South America. Although Pine (1972) revised the Genus *Carollia*, subspecies designations have not been clarified. Most of the characters used to differentiate species in this genus relate to color and banding patterns of the hair, the degree to which the mandibular incisors are hidden by the canines, and the distance between P1 and P2. Such traits are highly

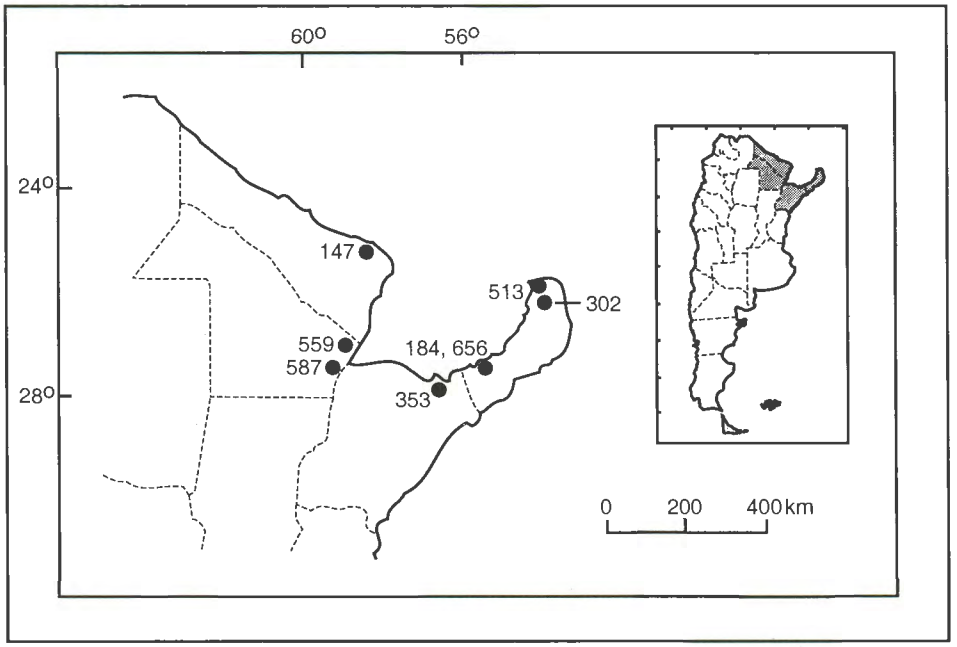


Figure 28. Map of the localities of *Carollia perspicillata*.

variable throughout the range of this species. Specimens from Argentina and Paraguay are difficult to identify, and it is easy to confuse *C. perspicillata* and *C. brevicauda*. Pine (1972) summarized the differences between the two species. In *C. perspicillata*, the quantity of hairs on the forearm and phalanges generally is less than in *C. brevicauda*. However, in the southern portion of its range, especially in the drainage of the Paraná River, the hair in *C. perspicillata* is long, strongly tricolored, and silky, and the phalanges and forearm are quite hairy. Except for size (*C. perspicillata* is generally larger than *C. brevicauda*), *C. perspicillata* is not readily differentiable from *C. brevicauda*. Specimens from Paraguay and northeastern Argentina key to *C. brevicauda* using the characters given by Pine (1972). In these specimens, the cingula of the mandibular canines do not totally hide the outer incisors, there is an evident space between the upper premolars, and the upper toothrow is not perfectly straight. Several specimens from Bolivia also have a mixture of these characters. Barquez (1977) identified specimens he collected in Bolivia as *C. perspicillata*, but Anderson et al. (1982) and Anderson (1997) later indicated that 11 were *C. brevicauda*. Myers and Wetzel (1983) reported specimens from Paraguay near Argentine localities cited here, and proposed that the subspecies should be recognized as *C. p. tricolor*. Thus there is some confusion with respect to the taxonomy of *Carollia* at the southern limits of the range of the genus; a taxonomic revision is required to clarify the taxon in southern South America.

Distribution in Argentina (Fig. 28).— Podtiaguin (1944) mentioned *Hemiderma perspicillatum* for the localities of Puerto Bermejo and Resistencia (Chaco) and Clorinda (Formosa), but did not mention the author, a precise source for the information, a catalog number, or the museum where the specimens were housed. Consequently, the species is considered probable in the provinces of Chaco and Formosa.

Description (Figs. 29 and 30).— Medium size; length of forearm ranges from 38 to 46 mm (42-44 mm in Argentine specimens). Pelage is soft and dense. Hairs of the dorsum are tricolored, with the base of the hairs having a wide, dark brown band, followed by a lighter band, generally cream colored (ashy in specimens from Paraguay) and with the tips having a narrow band similar in color to the basal one. The general coloration is like that of the tips, but the overall aspect is streaked. The venter is bicolored, varying in shades of light brown and with hairs having a dark basal band for half their length. In some Paraguayan specimens, hairs of the venter are tricolored with an additional very small white band, whereas in Bolivian specimens the hairs are unicolored, light brown or grayish brown. The pelage

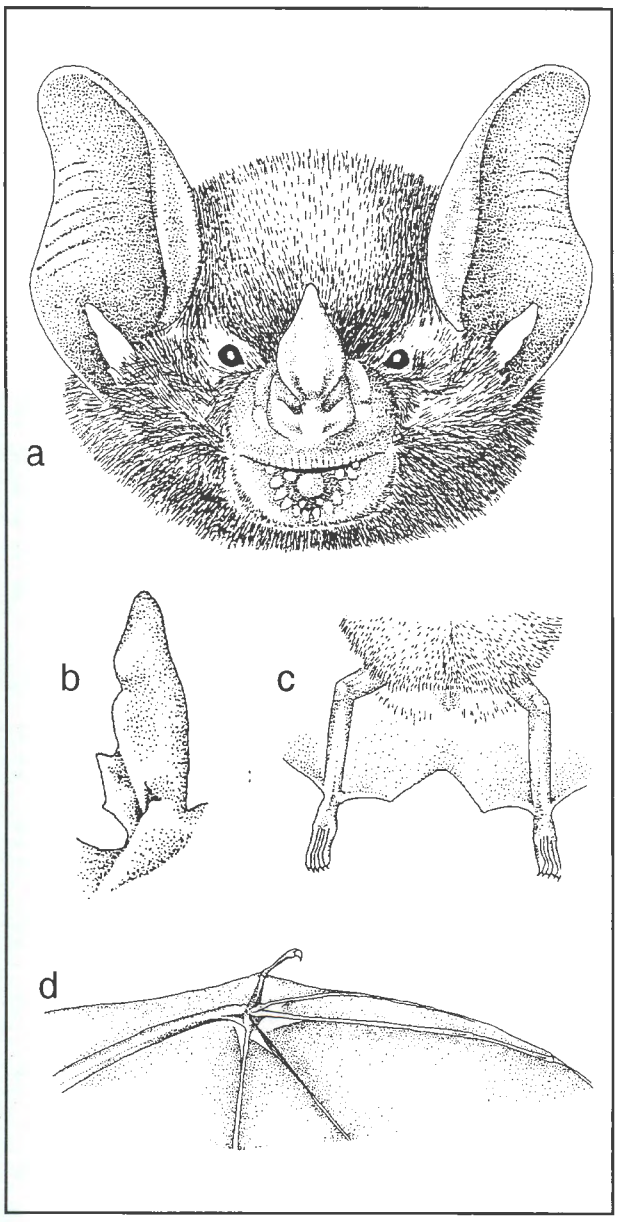


Figure 29. *Carollia perspicillata*: (a) face; (b) tragus; (c) uropatagium; and (d) articulation of the forearm and digits.

is generally restricted to the body and barely extends over the dorsal and ventral side of the plagiopatagium, over the proximal one-half of the forearm, and over the dorsal distal one-half of the ears. The uropatagium is well developed and the tail small, about 4 mm in length and included in the uropatagium (in a specimen from Ituzaingó the tail measures 9 mm); the calcar is short, less than the length of the foot. Wing membranes are well developed, the plagiopatagium attaching at the height of the knees. The nose leaf is long (about 10 mm) and narrow, the muzzle short, the upper lip is smooth, and lower lip has a large central wart surrounded by five or six smaller ones on each side arranged in a triangle. The ears are separated, longer than wide, and become narrower toward the tips, which are rounded. The inner surface of the ear has a series of parallel furrows and the anterior margin is keeled in some specimens. The tragus is well developed, narrow at the tip, and with a lateral emargination at the base.

The braincase is rounded and well developed. The zygomatic arches are incomplete and the sagittal crest is absent or slightly developed. The rostrum is short but inflated at the height of the orbits, producing a pronounced separation between the braincase and the rostrum. The palate is wide, extends posteriorly like a tube; the pterygoids are short and the hamular processes nearly reach the glenoid fossae. The tympanic bullae are small and the basisphenoidal pits are deep.

The dental formula is 2/2, 1/1, 2/2, 3/3, total 32. The I1 is well developed and slightly procumbent. The I2 is small and variable in shape, generally not completely filling the space between the canines. In some specimens, the upper incisors are rounded and small, while in others they increase in size, but rarely reach the height of the cingulum of the canines. The canines are very wide at the base and pointed at the tip with a well-marked concavity on the internal face. P1 is in contact with the posterolateral border of the canine, is unicuspidate, and generally in contact with P2. In a number of specimens examined, a space is clearly evident; this space is one of the characters used by Pine (1972) to differentiate *C. brevicauda* from other *Carollia*. The "W" pattern of the molars is not pronounced and the cusps are difficult to identify, although the paracone, metacone, and protocone are visible in M1 and M2, but not in M3, which is reduced and arranged perpendicularly to the toothrow.

The i1 and i2 are very small and may or may not be separated; i2 is about one-half the size of i1 and generally hidden by the cingulum of the canines in dorsal view. In juveniles, the incisors are bilobed, although this condition is lost with wear. Premolars are of similar size, p1 is in contact with the posterior border of the cingulum of the canine. The m1 and m2 are similar in size and m3 is smaller. The cusps are little differentiated, although the protoconid and metaconid are in close proximity.

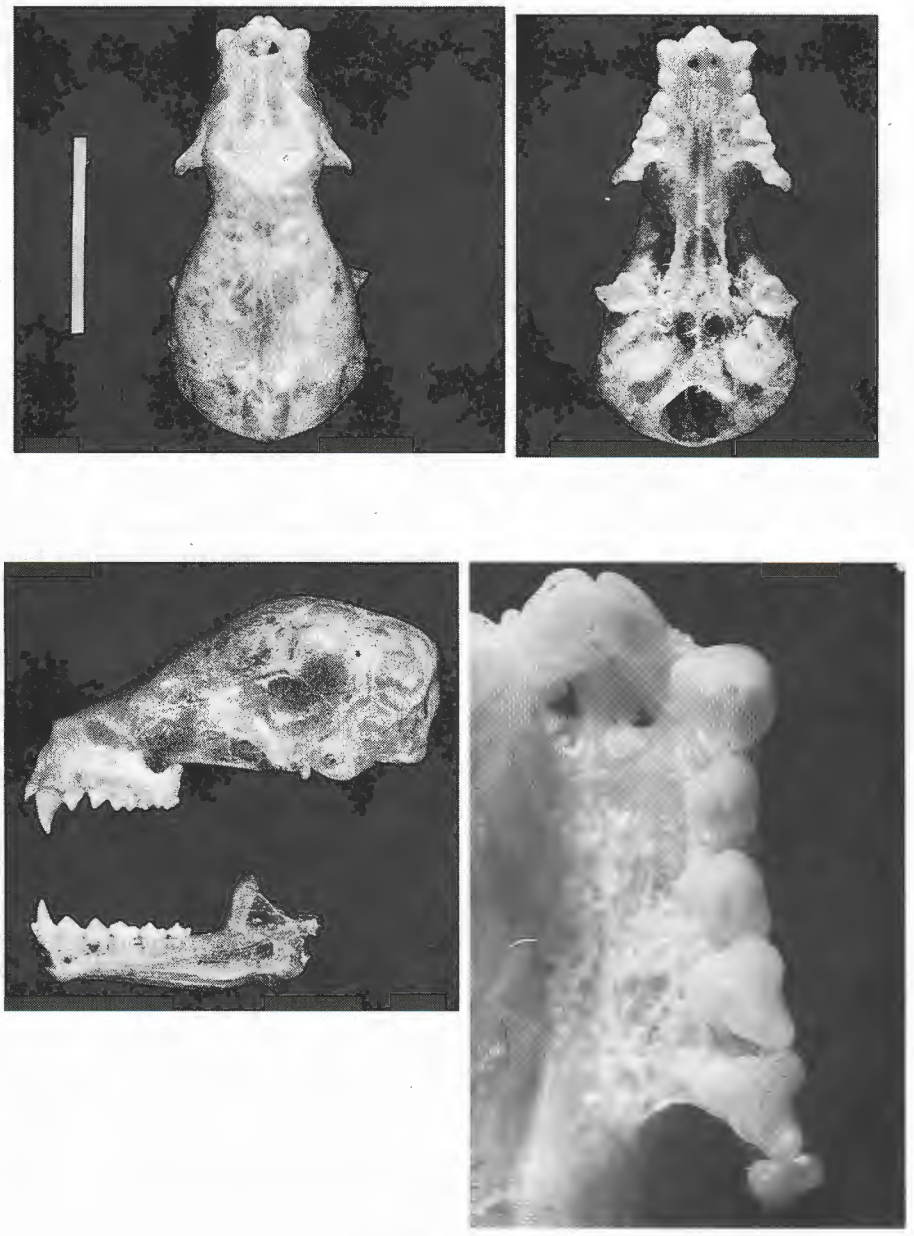


Figure 30. Skull and teeth of *Carollia perspicillata*. Adult female from Ituzaingó, Corrientes Province (MACN 16994). Bar = 1 cm. Teeth not to scale.

Measurements.— Table 3.

Comments.— This species may be abundant over much of its range, especially in disturbed areas (Brosset and Charles-Dominique, 1990; Charles-Dominique, 1991), but Argentine specimens are scarce. It was first reported in Argentina by Fornes and Massoia (1969). Roosts include bridges, culverts, tree holes, roofs of rural dwellings, caves, and crevices (e.g., Marques, 1985). Willig (1983) found it in buildings with *Glossophaga soricina*. It is colonial or solitary, and forages mainly on fruit, but some authors have reported insects. Sazima (1976) found individuals feeding on nectar of *Passiflora mucronata* and on the inflorescences of banana, *Musa acuminata*. Reproduction is summarized by Wilson (1979), who reported a bimodal polyestrous pattern. In

specimens collected in Bolivia, four females had open vaginas and one was pregnant (one embryo, crown-rump length = 5 mm) at the end of July, although not all bats collected were breeding (R. M. Barquez, personal observation).

Specimens Examined (8).— CORRIENTES: Ituzaingó, 1 (MACN). MISIONES: Gobernador Lanusse, 1 (CML); Parque Nacional Iguazú, 1 (MACN); San Ignacio, 5 (MACN).

Additional Records.— CHACO: Puerto Bermejo (Podtiaguin, 1944); Resistencia (Podtiaguin, 1944). FORMOSA: Clorinda (Podtiaguin, 1944). MISIONES: Arroyo Urugua-í (Massoia et al., 1987); Cueva María Antonia (Fornes et al., 1969).

SUBFAMILY STENODERMATINAE

Some authors divide this subfamily into Sturnirinae and Stenodermatinae, the former including only the Genus *Sturnira*; we follow Jones and Carter (1976) in using the single Subfamily Stenodermatinae (see also Owen, 1987). All species in this subfamily have a short, wide muzzle, lack an external tail, have a poorly developed or missing (*Sturnira*) uropatagium, and have variable color patterns. *Platyrrhinus* has a pale mid-dorsal stripe; *Pygoderma* has conspicuous white spots on the shoulders and a well-developed uropatagium; *Sturnira* has ochraceous shoulder patches and lacks a uropatagium; *Artibeus* and *Vampyressa* have facial stripes. A small but evident calcar (except in *Sturnira*), distinguishes this subfamily.

KEY TO THE SPECIES

1. White mid-dorsal stripe present ..... *Platyrrhinus lineatus*
1'. White mid-dorsal stripe absent 2

2 (1'). Facial stripes prominent 3
2'. Facial stripes obscure or absent 4

3 (2). Size small, length of forearm < 37 mm; tragus and margins of ear yellowish ..... *Vampyressa pusilla*
3'. Size large, length of forearm usually > 70 mm; tragus and margins of ear not yellowish ..... *Artibeus lituratus*
4 (2'). Shoulders usually with yellow, brown, orange, or white patches; uropatagium absent but, if present, covered with hairs on the dorsal surface; length of forearm < 50 mm 5
4'. Patches on shoulders absent; uropatagium naked; length of forearm > 50 mm, but < 70 mm 6

5 (4). White patch on each shoulder; dorsal surface of uropatagium densely furred; external margin of the ears, tragus, and base of the nose leaf yellowish; a well-defined fold of skin extends from the ventral margin of the nose leaf to the angle of the mouth, appearing like a "double upper lip"; upper toothrows bowed and almost semicircular; 28 teeth ..... *Pygoderma bilabiatum*
5'. Shoulders with cinnamon patches, sometimes not easily visible; uropatagium absent; inner margin of legs and rump densely furred; upper toothrow somewhat bowed but not forming a semicircle; 32 teeth 7

6 (4'). Length of forearm 62-69 mm; condylobasal length > 25 mm; facial stripes weak, M3 small but present; M2 about 3.6 mm wide; at present known only for the provinces of the northwest of the country ..... *Artibeus planirostris*

6'. Length of forearm 64-67 mm; condylobasal length > 27.9 mm; facial stripes weak or absent; M3 absent (present in a low percentage); width of M2 > 4.0 mm; at present known only for the provinces of Misiones and Chaco ..... *Artibeus fimbriatus*

7 (5'). Lingual ridge of lower molars not serrated; lower incisors usually bilobed 8
7'. Lingual ridge of lower molars serrated; lower incisors usually trilobed ..... *Sturnira lilium*

8 (7). Size large, length of forearm > 44 mm; upper toothrow almost parallel; middle upper incisors ending with a straight margin, sometimes lightly bilobed ..... *Sturnira oporaphilum*
8'. Size smaller; length of forearm < 43 mm; upper toothrow slightly curved; middle upper incisors somewhat rounded ..... *Sturnira erythromos*

Genus *Sturnira*

There are 12 species in this genus in the Neotropics. Literature records for this genus in Argentina referred to only one species, *Sturnira lilium*, until analysis of collection material permitted the differentiation of three forms, *S. lilium*, *S. erythromos*, and *S. oporaphilum* (Barquez et al., 1993; Mares et al., 1995). *S. lilium* is the most common; *S. erythromos* is apparently very common; and *S. oporaphilum* is scarce but widely distributed. The three species are sympatric in northwestern Argentina. *S. erythromos* and *S. oporaphilum* previously were known to occur only as far south as Bolivia (Anderson, 1997), where they apparently are found above the altitudinal limits of *S. lilium*, with which there is limited overlap. The three species are very similar, but can be readily differentiated morphologically or genetically (e.g., Pacheco and Patterson, 1991).

Sturnira erythromos (Tschudi)

Ph(llostoma) erythromos Tschudi, Therologie. Untersuchungen über die Fauna Peruana. Scheitlin und Zollikofer, St. Gallen, Switzerland, p. 64, 1844.

Sturnira erythromos: de la Torre, Unpublished Ph.D. dissertation,University of Illinois, Champaign, p. 124, 1961.

This species frequently has been synonymized with *S. lilium*. However, since de la Torre (1961), most authors have considered it distinct.

Type Locality.— Peru.

Distribution.— Until the revision by Jones and Carter (1976), this species was known only in Peru from east of the Andes. Koopman (1993) gave its distribution as extending from Venezuela to Bolivia. Anderson et al. (1982) reported the southern range limits in Bolivia as Tarija Department on the border with Argentina.

Distribution in Argentina (Fig. 31).— Known only for the provinces of Salta, Jujuy, and Tucumán, but apparently not limited to high elevations as some specimens have been captured at the limits of subtropical forest and chaco thornscrub below 500 m. Anderson et al. (1982) reported specimens from localities below 1000 m, but most were collected above 1285 m.

Description (Figs. 32, 33a, 34a, and 35a).— This is the smallest species of the genus found in Argentina, with the length of forearm ranging from 38.7 to 43.0 mm (few individuals have measurements larger than the smallest *S. lilium*). The skull is always smaller than in other *Sturnira*; maximum greatest length of skull recorded was 21.4 mm. External appearance is similar to the other species, but the bases of the dorsal hairs and the general coloration of the body are darker. With respect to color, it can be confused only with *S. oporaphilum*, but the pelage is paler and the bands of the hairs are only slightly marked or absent. The intensity of the color of the bands is variable, however. In most of the specimens, the basal one-half is dark brown, followed by an ash gray or whitish band of about 3 mm, and a small tip of dark brown, gray, or almost black, about 1 to 2 mm. In some specimens from Tucumán Province, the terminal color band is not present in many of the hairs so that the general color of the middle band dominates, giving them a paler aspect. In juveniles, the bands of the hair are not readily distinguishable and are generally very dark. All but three specimens (from Playa Larga, Tucumán Province) lacked the ochraceous shoulder.

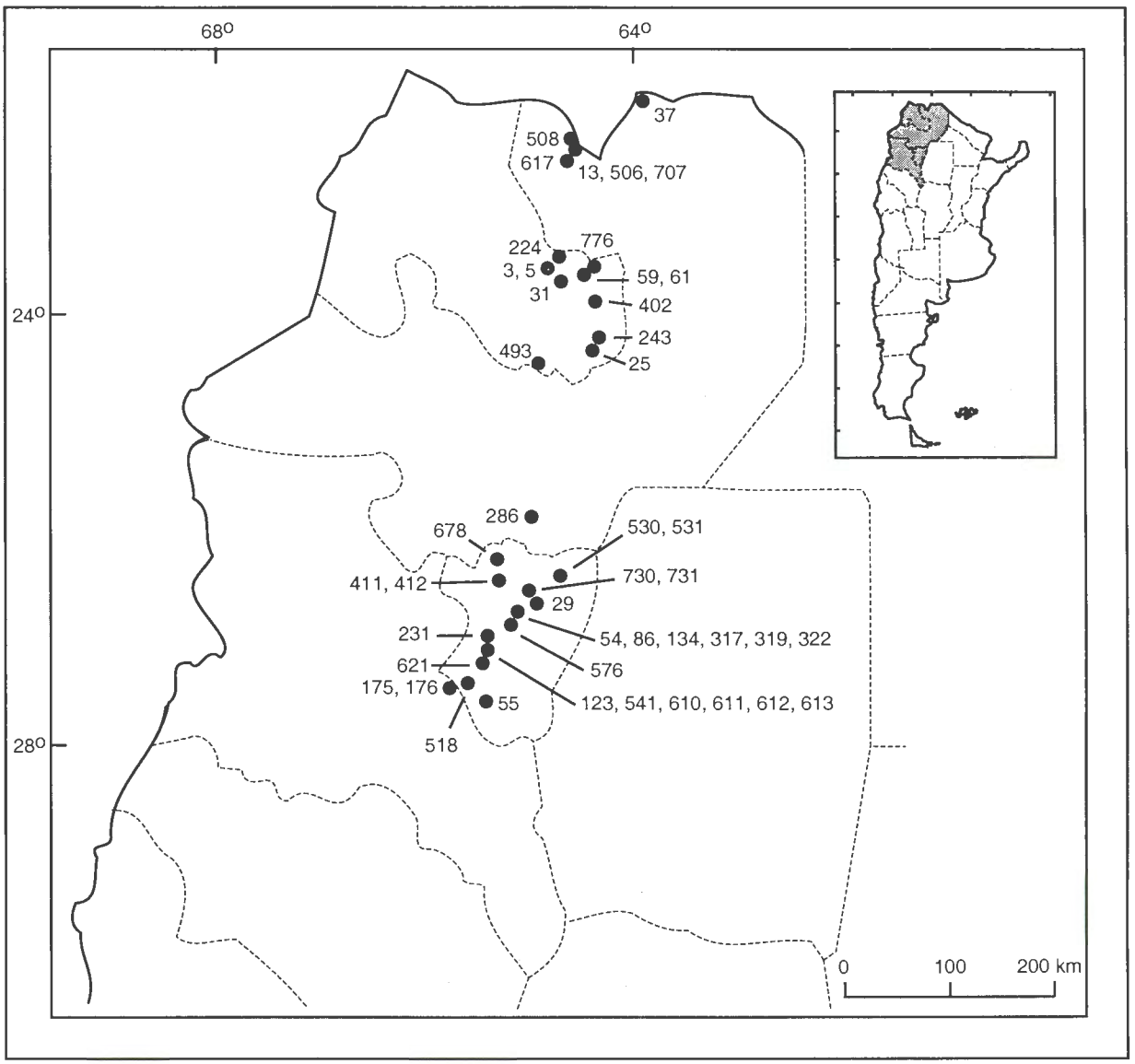


Figure 31. Map of the localities of *Sturnira erythromos*.

The skull is generally similar to *S. lilium* and *S. oporaphilum*, differing from both by its smaller size. It can be distinguished from *S. lilium* by its bilobed lower incisors and the smooth lingual edge of the lower molars; in some individuals the incisors are weakly trilobed. In these characters this species is more similar to *S. oporaphilum* (although the body size is smaller). In *S. oporaphilum* the upper toothrows are almost straight, whereas in *S. erythromos* they are curved. The dental formula is as in *S. lilium*.

Measurements.— Table 4.

Comments.— Little is known about the biology of this species in Argentina. It apparently reproduces at the same time as *S. lilium*. In Playa Larga, Tucumán Province, a male had scrotal testes at the end of October and a female was near parturition. At the same time in this same locality a female *S. lilium* was pregnant with a fetus about 3 mm in crown-rump length. In Laguna La Brea, Jujuy Province, juveniles with cartilaginous phalanges were found in the middle of June and, in Serranía de las Pavas, Salta Province, all three species were reproductively active at the end of November. This species is quite distinct genetically from either *S. lilium* or *S. oporaphilum* (Pacheco and Patterson, 1991).

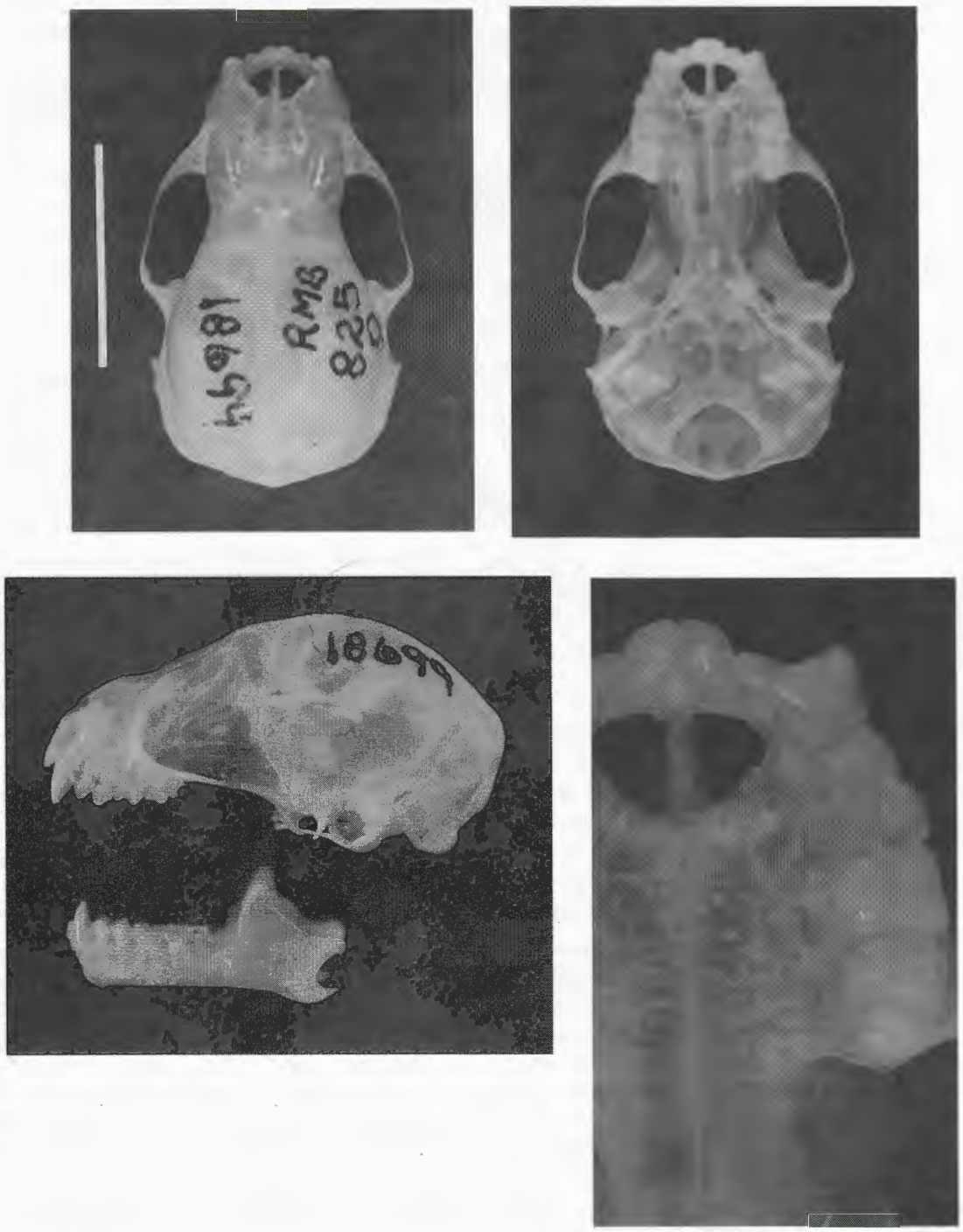
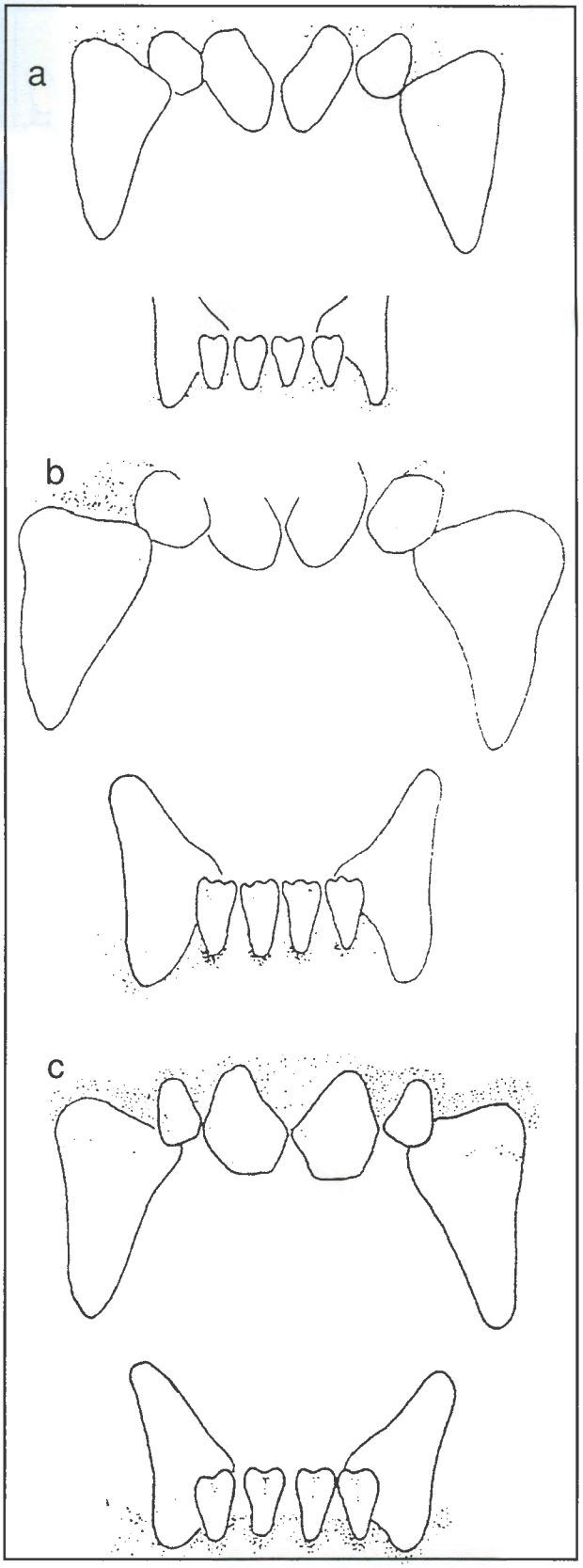


Figure 32. Skull and teeth of *Sturnira erythromos*. Adult female from Playa Larga, Río Los Sosa, Ruta 307 km 19.7, Tucumán Province (OMNH 18699). Bar = 1 cm. Teeth not to scale.



Specimens Examined (116).— CATAMARCA: Cuesta del Clavillo, 3 km SW La Banderita, 13 (CML). JUJUY: Abra de Cañas, 1724 m, 1 (CML); Abra de Cañas, app. 30 km NW Calilegua, sobre ruta a Valle Grande, 2 (CM); Aguas Blancas, 14 km E Santa Clara, 9 (OMNH); Aguas Negras, Parque Nacional Calilegua, 1 (CML); Arroyo Sauzalito, Parque Nacional Calilegua, 4 (CML); Arroyo Yuto, 13 km SW Yuto, 1 (MD); El Duraznillo, 3000 m, Cerro Calilegua, 5 (CML); El Simbolar, 25 km SW Palma Sola, 1 (CM); Laguna La Brea, 2 (OMNH); On Highway 9 at border with Salta, at campground on the way to El Carmen, 2 (1 IADIZA-CM, 1 OMNH); Yuto, 1 (CML). SALTA: Agua Blanca, 24 km NW, 5 (4 CM, 1 TTU); Alto Macueta, 2 km N del cruce de Macueta y Campo Lago, 1 (AA); Finca San Lorenzo, Rosario de La Frontera, 1 (TTU); Parque Nacional Baritú, Finca Jakulica, Angosto del Río Pescado, 650 m, 6 (CML); Parque Nacional Baritú, Las Juntas de Río Lipeo y Bermejo, 1 (CML); Río Pescado, 1 (TTU); Serranía de las Pavas, 3 (1 CML, 2 PIDBA). TUCUMÁN: Aguas Chiquitas, El Cadillal, 1 (CM); Arroyo de las Cañas, Horco Molle, 4 (CML); Arroyo El Saltón, Reserva Provincial Santa Ana, 1 (CML); Casa de Piedra, Río Los Sosa, ruta 307, km 24.9, 850 m, 8 (OMNH); Cerro San Javier, 2 (CML); El Naranjal, 1 (TTU); Horco Molle, 15 km W San Miguel de Tucumán, 11 (CM); Horco Molle, Biological Reserve, 1 (OMNH); Horco Molle, Río Las Cañas, 1 (CML); Las Juntas, 22 km W Choromoro, 1 (OMNH); Las Juntas, 22 km W Choromoro on Hwy 312, 3,500 ft., 1 (CML); Parque Provincial El Cochuna, km 40 sobre ruta 47, 1 (PIDBA); Piedra Tendida, 12 km WNW Burruyacú along Río Cajón, 2,500 ft., 3 (1 CML, 1 IADIZA-CM, 1 OMNH); Piedra Tendida, 5 km W de Dique El Cajón, 1 (CML); Playa Larga, Río Los Sosa, Ruta 307 km 19.7, 2 (1 OMNH, 1 PIDBA); Quebrada de Lules, 11 km SW San Pablo, 3 (CM); Río Los Sosa, Ruta 307, km 24, 1 (CML); Río Pueblo Viejo, Reserva Provincial La Florida, 10 (CML); San Pedro de Colalao, south of, at km marker 42, on Hwy 364, 4,700 ft, 1 (OMNH); Ticucho, 3 km E, 1 (CML); Ticucho, entrando por cola del Dique El Cadillal, 1 (OMNH).

Figure 33. Frontal view of incisors and canines of: (a) *Sturnira erythromos*; (b) *Sturnira lilium*; and (c) *Sturnira oporaphilum*.

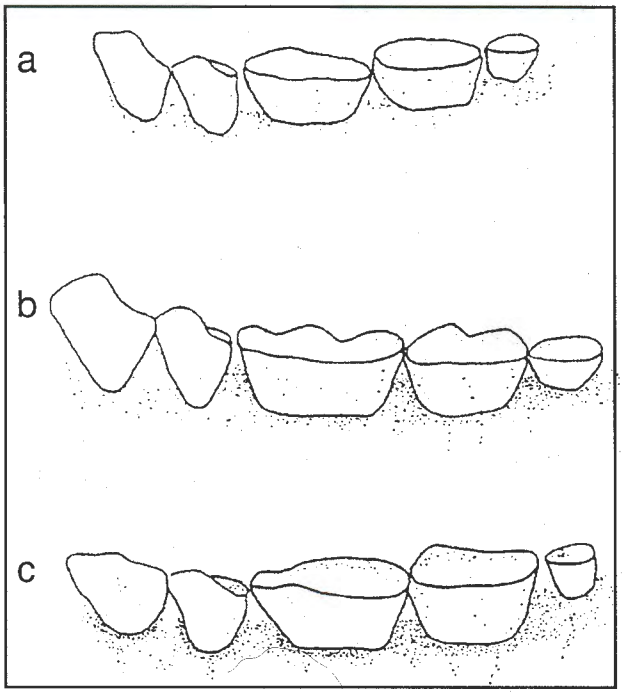


Figure 34. Lateral view of lower toothrows of: (a) *Sturnira erythromos*; (b) *Sturnira lilium*; and (c) *Sturnira oporaphilum*.

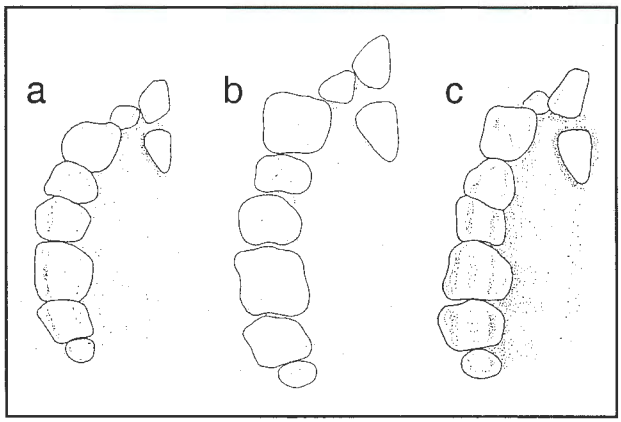


Figure 35. Dorsal view of upper toothrows of: (a) *Sturnira erythromos*; (b) *Sturnira lilium*; and (c) *Sturnira oporaphilum*.

Additional Records.— CATAMARCA: Cuesta del Clavillo, 5 km S La Banderita (Mares et al., 1997). TUCUMÁN: Biological Reserve at Horco Molle, near residencia (Mares et al., 1995, 1996) (= Horco Molle, Biological Reserve); Río Los Sosa, Ruta 307, km 19.7, camino a Tafí del Valle, 750 m (Mares et al., 1996) (= Playa Larga, Río Los Sosa, Ruta 307 km 19.7); Río Los Sosa, Ruta 307, km 23.9, camino a Tafí del Valle, 850 m (Mares et al., 1996) (= Casa de Piedra, Río Los Sosa, ruta 307, km 24.9, 850 m); Río Los Sosa, Ruta 307, km 24.9, camino a Tafí del Valle, 850 m (Mares et al., 1996) (= Casa de Piedra, Río Los Sosa, ruta 307, km 24.9, 850 m).

Sturnira lilium (É. Geoffroy St.- Hilaire)

Phyllostoma lilium É. Geoffroy St.- Hilaire, Annales du Muséum d'Histoire Naturelle, Paris, 15:181, 1810.

Sturnira lilium: Gervais, Deuxième Mémoire. Documents zoologiques pour servir à la monographie des Chéiroptères Sud-Américains. Pp. 25-88, *in* P. Gervais, ed., Mammiféres. *In* Animaux nouveaux ou rares recueillis pendant l'expédition dans les parties centrales de l'Amérique du Sud, de Rio de Janeiro a Lima, et de Lima au Para; exécutée par ordre du gouvernement Français pendant les années 1843 à 1847, sous la direction du comte Francis de Castelnau (F. Castelnau, ed.). P. Bertrand, Paris, 1(2):39, 1855 (1856).

Type Locality.— Paraguay; restricted to Asunción by Cabrera (1958) who considered that Geoffroy St.-Hilaire based his original description on data from Azara who collected the majority of his specimens at that locality. Additionally, de la Torre (1961) agreed with Cabrera and both indicated that a type specimen does not exist and that the specimen mentioned by Rode (1941) as being housed in the Natural History Museum in Paris seemed to be in error. However, Carter and Dolan (1978) examined the skin and skull of a specimen in that museum (Type Number 195), which was collected by Felix de Azara in Asunción. They suggested that it was the holotype or syntype used by Geoffroy St.- Hilaire in his original description.

Distribution.— Mexico and part of the Caribbean to northern Argentina and Uruguay. Two subspecies are recognized in South America: *S. l. parvidens* from Colombia northward; and *S. l. lilium* south of Colombia.

Distribution in Argentina (Fig. 36a and 36b).— Restricted to the forests of the northwest and northeast. Two records are doubtful. One was cited by Yepes (1944) for Seclantás, Salta Province, a locality in the Monte Desert, which would not appear to be suitable

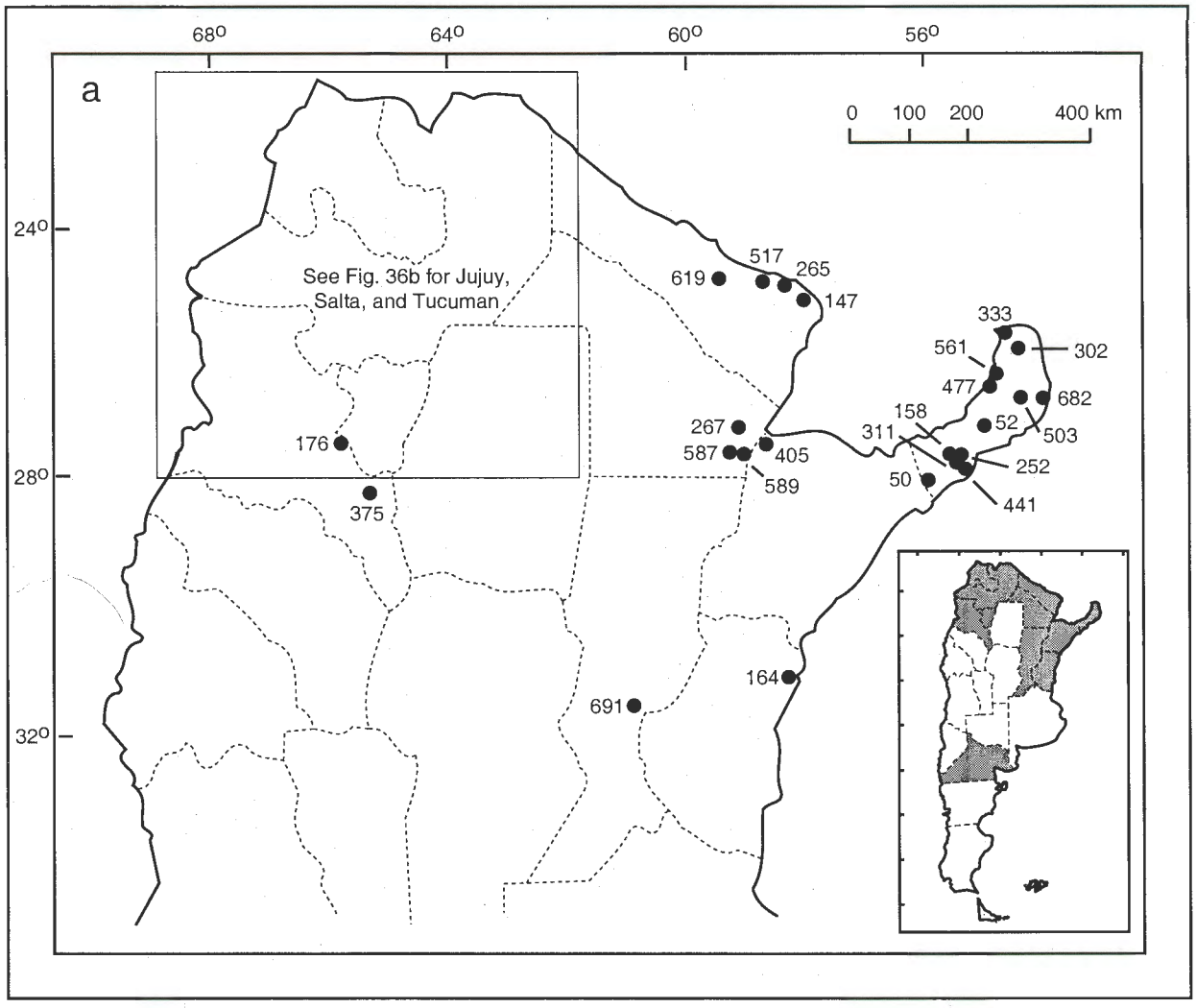


Figure 36a. Map of the localities of *Sturnira lilium*. See Figure 36b for localities in the provinces of Jujuy, Salta, and Tucumán.

habitat for the species. We were unable to locate this specimen in either the Buenos Aires or La Plata museums, where his collections are housed. The second locality is Río Negro, mentioned as doubtful by Cabrera (1958). In the Natural History Museum, London, a specimen of this species whose only locality data is "Patagonia" was examined (R. M. Barquez, personal observation). Although the locality is imprecise, if correct, it would indicate an important extension of the distribution of *S. lilium*. However, we consider the latter locality as doubtful since the specimen is part of a group of specimens housed at the Natural History Museum, London that are problematical, as they represent what appear to be new, but improbable, localities for several species. The majority of the specimens are in alcohol and lack original numbers. They were sent to London by Dr. Roberto Dabbene from the Museo de Ciencias Naturales de Buenos Aires and their provenience is difficult to determine.

Description (Figs. 33b, 34b, 35b, 37, and 38).—This is a medium-sized *Sturnira*; length of the forearm ranges from 39.9 to 49.9 mm. In most individuals a cinnamon or yellowish patch is evident on the shoulders, but its presence or absence is highly variable, as is its intensity. Body color is equally variable, juveniles are darker than adults and their hairs are bicolored. The species has three color phases. In the reddish or orange

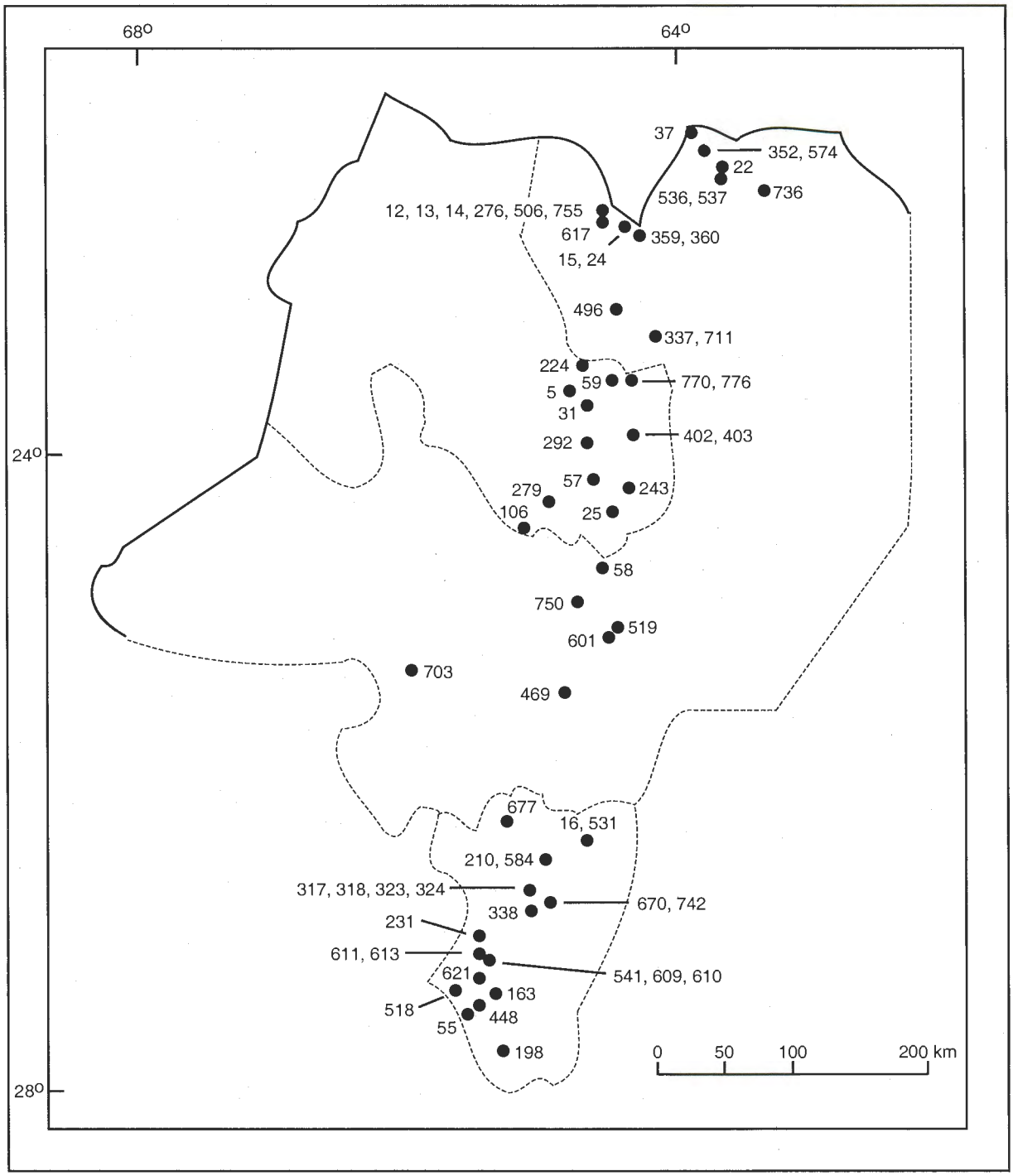


Figure 36b. Map of the localities of *Sturnira lilium* in the provinces of Jujuy, Salta, and Tucumán.

phase, the hairs of the dorsum are yellowish for almost their entire length, the tips have a reddish cast, and the venter is a uniform pale orange. In the gray-brown phase, the basal section of the hairs is pale, ash or dirty white, the tips dark gray brown, and the venter uniformly pale gray. The third or pale phase has dorsal hairs that are generally light ash with shades of light gray-brown or with an orange tint; the venter is light gray. In general, pregnant and lactating females are reddish in color. The membranes are dark, almost black in most specimens,

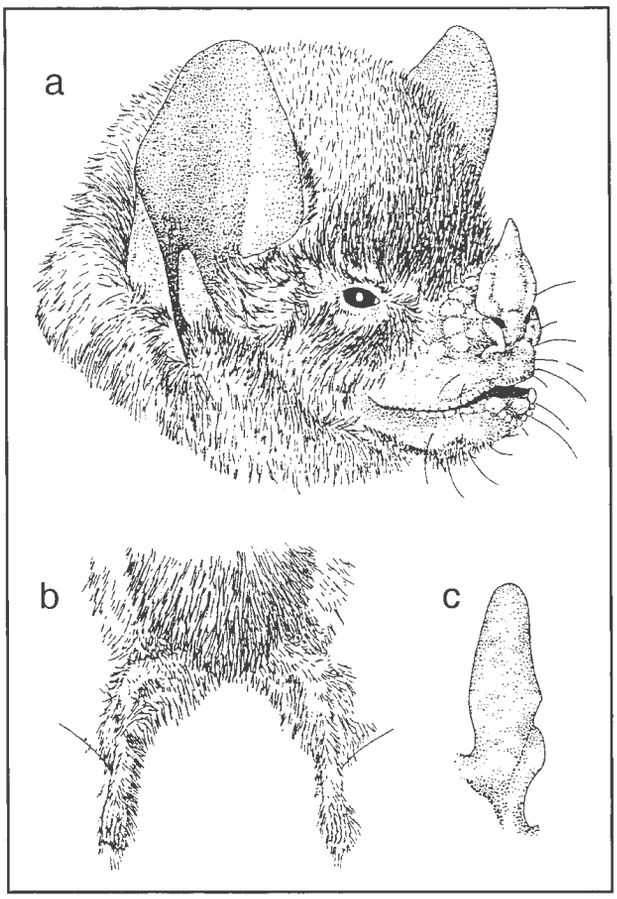


Figure 37. *Sturnira lilium*: (a) face; (b) hindquarters; and (c) tragus.

but some are paler, generally gray. One of the most important characters for identifying this genus is the absence of the uropatagium and tail. The hair extends to the proximal one-half of the forearm on both the dorsal and ventral sides, and on the dorsal side of the legs. Hairs are sparsely scattered over the plagiopatagium along the sides of the body, in the border where this membrane attaches to the ankles, and over the ventral surface of the propatagium. The snout is short. Ears are small and widely separated, somewhat triangular in shape, and with the distal one-half of the outer margin straight and the proximal one-half convex; the antitragus is poorly developed. The tragus is well developed, triangular, becomes thinner toward the tip, and has a small, but well-defined basal concavity. The nose leaf is short, about 8 mm, very wide at the base, narrower toward the tip, and lanceolate in form. A series of glands borders the basal portion of the nose leaf toward the sides and front of the eyes. The upper lip and the nose leaf are separated by a space. The margin of the lip is bordered by small papillae that vary in number. The lower lip has a group of papillae, with a larger central one surrounded by smaller ones on both sides; their number and location are variable. The calcar is absent.

The braincase is inflated and elevated; the length of the rostrum is less than the length of the braincase; zygomatic arches are complete but weakly developed. A sagittal crest is present, but not well developed, particularly in females and juveniles. Incisive foramina are very large. The palate projects posteriorly like a tube, with the hamular processes of the pterygoids ending at the level of the glenoid fossa. The caudal spine of the palate is undifferentiated, giving the posterior border of the hard palate the aspect of a continuous, uninterrupted line. Basilar pits are shallow. Tympanic bullae are small, covering only the anterolateral part of the cochlea.

The dental formula is I 2/2, C 1/1, P 2/2, M 3/3, total 32. The upper incisors completely fill the space between the canines; I1 is about twice the size of I2 and in contact with it at the base; I1 barely exceeds the height of the cingulum of the canine. The upper incisors project medially and have a marked concavity, like a furrow, on the anterior surface. Canines are robust, but relatively short and with a shallow concavity along their internal face. Premolars are simple, with a single cusp and a concavity toward the lingual side; P1 is triangular in shape when viewed dorsally and is smaller than P2; P2 is square and higher than the other molariform teeth. M1 and M2 have a barely visible paracone and metacone. The other cusps are not evident and produce a longitudinal furrow on the occlusal surface of each molar, the furrow reduced or vestigial in many individuals. All molars are square or almost square, and decrease in size from M1 to M3. The protocone of the molars is elongate and forms the inner border of the aforementioned furrow.

The i1 and i2 are small, subequal in size, trilobed, and completely fill the space between the canines. The posterior part of the cingulum of the canine is in contact with p1; p1 is larger than p2, the reverse of the upper premolars. The paraconid of m1 is low and procumbent; the metaconid and entoconid are also low but more differentiated, so that when viewed laterally the internal surface of the molars appears serrated (this is not observed in the other two Argentine species). The small paraconid and metaconid of m2 are in close prox-

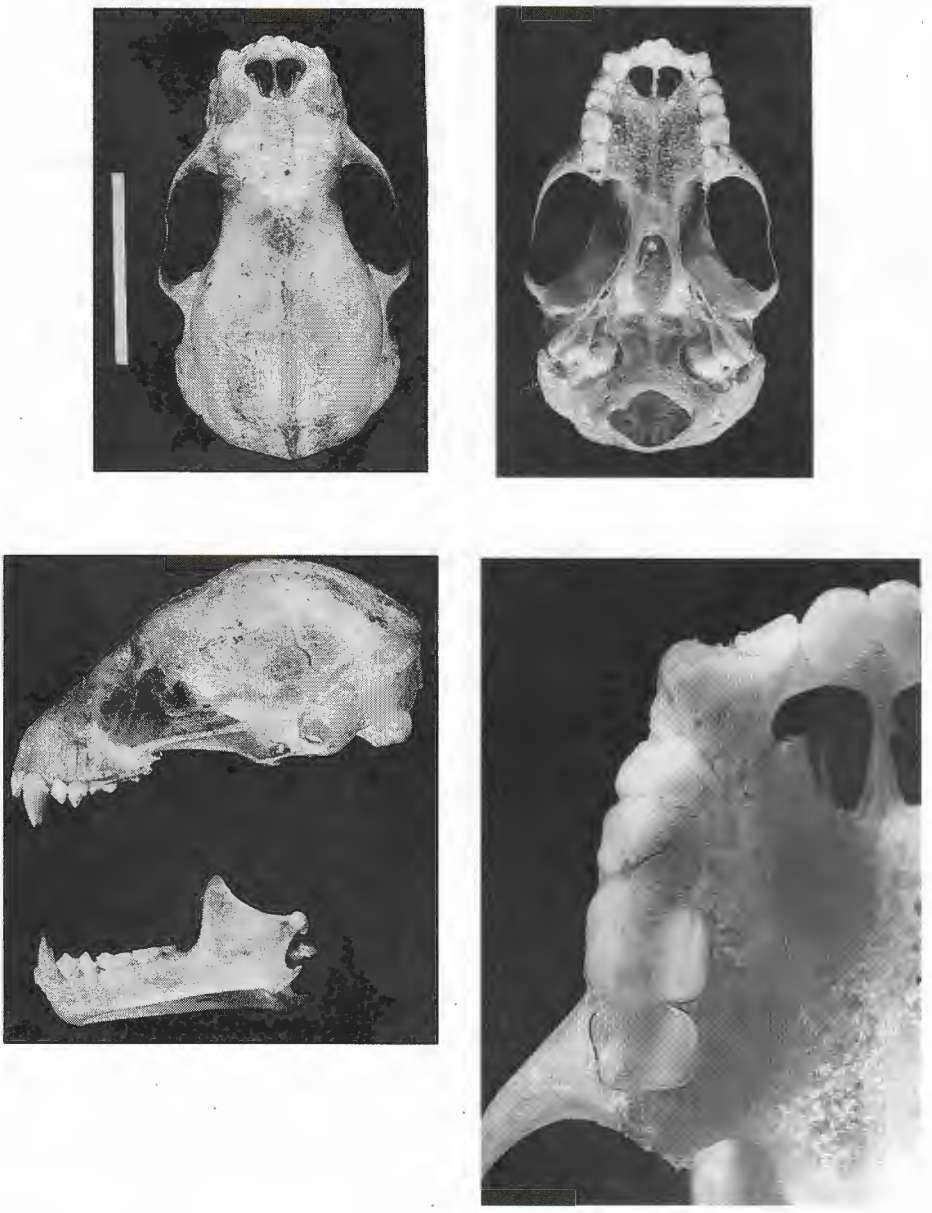


Figure 38. Skull and teeth of *Sturnira lilium*. Adult male from Piquirenda Viejo, Salta Province (OMNH 18736). Bar = 1 cm. Teeth not to scale.

imity; the entoconid is well marked; the protoconid and hypoconid are almost absent. The m3 is small, with less than one-half the occlusal surface of m2, and with the cusps generally undifferentiated.

Measurements.— Table 4.

Comments.— Most specimens were captured in the lower strata of forests, with many trapped in mist nets at ground level. We have observed them flying in groups along defined routes to feed up to 10 km away from their shelters. Brosset and Charles-Dominique (1990) reported that this species was netted in disturbed

habitats in French Guiana. This species appears to be uncommon in urban areas in Argentina; however, skulls of juvenile and subadults were found in barn owl (*Tyto alba*) pellets, where the owls were nesting in buildings in downtown Tucumán city (R. M. Barquez, personal observation). Whether or not the owls were foraging in the city, or in forests 20 km away, is unknown. Owls have been shown to capture a wide array of bats in the Neotropics (Motta Junior and Taddei, 1992).

Reproductive activity in Argentina is greatest from October to December, with most births occurring at the end of November. Although uncommon, some reproductive activity occurs throughout the year; a female was found lactating in April (late fall) in the Arroyo Los Noques, Parque Nacional El Rey, Salta Province. In French Guiana, this species was shown to breed from June to August (Brosset and Dubost, 1967).

Sturnira lilium feeds primarily on fruit, although they also may feed on pollen and nectar.

Specimens Examined (420).— CATAMARCA: Cuesta del Clavillo, 5 km S La Banderita, 1 (RMB); La Merced, 3 (1 MACN, 2 TTU). CHACO: Estancia San Miguel, along Hwy 90, 15 km NW jct. Hwy 90 and Hwy 11, 6 (3 CML, 2 IADIZA-CM, 1 OMNH); Resistencia, 1 (MACN). CORRIENTES: Laguna Paiva, B° Las Lomas, 4 (3 CML, 1 OMNH). FORMOSA: Clorinda, 1 (TTU); Estancia Las Mercedes, 1 (TTU); Estero de los Patos, 5 (TTU); Río Porteño, 5 km S Estancia Santa Catalina, 1 (CML). JUJUY: Abra de Cañas, app. 30 km NW Calilegua, sobre ruta a Valle Grande, 2 (CM); Aguas Blancas, 14 km E Santa Clara, 4 (OMNH); Aguas Negras, Parque Nacional Calilegua, 15 (14 CML, 1 RMB); Arroyo Sauzalito, Parque Nacional Calilegua, 2 (CML); Camino de Cornisa, 10 km W Dique La Ciénaga, 1 (CML); El Duraznillo, 3000 m, Cerro Calilegua, 1 (CML); El Simbolar, 25 km SW Palma Sola, 5 (CM); Fraile Pintado, 12 km W, sobre Río Ledesma, 1 (MD); Laguna La Brea, 12 (OMNH); Laguna La Brea, 25 km W Palma Sola, 13 (CML); Vinalito, 2 km al NW, al borde del segundo canal, 1 (MD); Yuto, 3 (AMNH). MISIONES: Aristóbulo del Valle, 10 km W by road along Río Cuñapirú, 2 (1 CML, 1 IADIZA-CM); Colonia Mártires, 5 (1 MACN, 4 TTU); Gobernador Lanusse, 4 (CML); Iguazú, 56 (MACN); Misiones (no specific locality), 1 (TTU); Misiones, 200 m (no specific locality), 2 (BMNH); Montecarlo, 2 (FMNH); Paraje Paraíso, 16 km SE, sobre ruta 21, 5 (CML); Puerto Piray, Ruta 12, 1 (MACN); San Pedro, 47 km SE, 18 (15 CML, 3 RAO). SALTA: Agua Blanca, 20 km NW, 2 (TTU); Agua Blanca, 24 km NW, 11 (CM); Agua Blanca, 25 km NW, 5 (TTU); Agua Blanca, 5 km W, 4 (3 MACN, 1 TTU); Aguaray, 2 (MACN); Aguas Blancas, 4 (CML); Alto Macueta, 2 km N del cruce de Macueta y Campo Lago, 1 (AA); Arroyo Los Noques, Parque Nacional El Rey, 15 (CM); Finca El Arrazayal, Serranía de las Pavas, 2 (1 CML, 1 OMNH); Ingenio San Martín del Tabacal, 3 (TTU); Itaú (Campo Largo), Sierras de Tartagal, 1600 m, 3 (CML); Junta de los Ríos Tarija y Bermejo, 4 (CML); Juntas de San Antonio, 17 (CM); Metán, 850 m, 1 (BMNH); Orán, 20 km al NW, 9 (MACN); Parque Nacional Baritú, Finca Jakulica, Angosto del Río Pescado, 650 m, 1 (CML); Paso de la Cruz, 2 (CML); Piquirenda Viejo, 30 km N Tartagal, 19 (11 CM, 8 OMNH); Piquirenda Viejo, 6 km W, 18 (4 CML, 14 OMNH); Quebrada de Acambuco, 5 km W Dique Itiyuro, 1 (RAO); Río El Naranjo, 14 km W de Ruta provincial 5, 1 (CML); Río Pescado, 21 (TTU); Tabacal, 4 (3 MACN, 1 TTU); Tonono, 1 km E sobre Río Itiyuro, 8 (CML); Unchimé, 1 (ROM); Vado de Arrazayal, 20 km NW Aguas Blancas, 6 (CML). SANTA FE: Santa Fe, 1 (MFA). TUCUMÁN: Agua Colorada, 11 (9 MACN, 2 TTU); Arroyo El Saltón, Reserva Provincial Santa Ana, 1 (CML); Concepción, 1 (BMNH); Dique San Ignacio, 1 (OMNH); El Cadillal, Estación de Piscicultura, 1 (OMNH); El Naranjal, 1 (TTU); Horco Molle, 15 km W San Miguel de Tucumán, 7 (CM); Horco Molle, 900 m, 2 (CML); Horco Molle, Río Las Leñas, 2 (CML); Horco Molle, Río Las Piedras, 25 (CML); Ingenio San Pablo, 1 (MACN); Los Sarmientos, 1 (CML); Parque Provincial El Cochuna, km 40 sobre ruta 47, 4 (CML); Piedra Tendida, 5 km W de Dique El Cajón, 1 (CML); Playa Larga, Río Los Sosa, Ruta 307 km 19.7, 6 (OMNH); Reserva Provincial "Aguas Chiquitas" El Cadillal, 1 (CML); Río Los Sosa, Ruta 307, km 23.9, camino a Tafí del Valle, 850 m, 1 (OMNH); Río Los Sosa, Ruta 307, km 24.9, camino a Tafí del Valle, 850 m, 2 (OMNH); Río Pueblo Viejo, Reserva Provincial La Florida, 1 (CML); San Miguel de Tucumán, 1 (BMNH); San Pedro de Colalao, 1 (CML); Tucumán, 1 (FMNH). NO SPECIFIC LOCALITY: Patagonia, 1 (BMNH).

Additional Records.— CHACO: Resistencia, márgenes del Río Paraná (Romaña and Abalos, 1950). ENTRE RÍOS: Concordia, 32 km N (Barquez and Lougheed, 1990). FORMOSA: Parque Nacional Río

Table 4. Measurements of Sturina erythromos, Sturnira lilium, *and* Sturnira oporaphilum. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Sturina erythromos*	*Sturnira lilium*	*Sturnira oporaphilum*
Total length	55.3 ± 3.49, 36 50.0 - 63.0	62.1 ± 6.31, 110 50.0 - 90.0	67.1 ± 13.73, 3 58.5 - 83.0
Hindfoot length	10.9 ± 1.99, 36 8.0 - 16.8	11.6 ± 1.41, 104 8.8 - 15.7	9.5 ± 0.50, 3 9.0 - 10.0
Ear length	16.8 ± 1.36, 35 13.0 - 18.7	16.6 ± 2.34, 109 11.0 - 20.0	17.8 ± 0.77, 3 17.0 - 18.5
Forearm length	41.1 ± 1.02, 35 38.7 - 43.0	43.5 ± 1.86, 113 39.2 - 49.0	44.7 ± 1.15, 3 44.0 - 46.1
Weight	16.0 ± 2.45, 33 12.0 - 23.0	21.5 ± 2.62, 71 14.0 - 28.0	21.6 ± 2.08, 3 20.0 - 24.0
Condylobasal length	18.7 ± 0.46, 35 18.0 - 19.7	20.4 ± 0.51, 110 19.5 - 21.7	20.6 ± 0.36, 3 20.3 - 21.0
Least interorbital breadth	6.2 ± 0.36, 19 5.4 - 6.9	6.3 ± 0.28, 43 5.6 - 6.9	6.5 ± 0.34, 3 6.3 - 6.9
Zygomatic breadth	12.6 ± 0.53, 26 11.1 - 13.6	13.6 ± 0.73, 78 10.0 - 14.8	13.8 ± 0.55, 3 13.5 - 14.5
Greatest length of skull	20.5 ± 0.42, 36 19.6 - 21.4	22.5 ± 0.54, 112 21.0 - 23.9	22.6 ± 0.60, 3 22.0 - 23.2
Postorbital constriction	5.8 ± 0.18, 35 5.5 - 6.2	6.0 ± 0.21, 111 5.5 - 6.5	6.1 ± 0.11, 3 6.0 - 6.2
Breadth of braincase	9.8 ± 0.23, 35 9.4 - 10.5	10.4 ± 0.23, 111 9.7 - 11.1	10.4 ± 0.25, 3 10.2 - 10.7
Length of maxillary toothrow	5.7 ± 0.21, 34 5.1 - 6.2	6.5 ± 0.23, 108 5.9 - 7.2	6.5 ± 0.20, 3 6.4 - 6.8
Palatal length	8.2 ± 0.38, 35 7.4 - 9.4	9.3 ± 0.45, 105 7.9 - 11.5	9.1 ± 0.41, 3 8.8 - 9.6
Mastoidal breadth	11.3 ± 0.23, 22 11.0 - 11.9	12.1 ± 0.40, 75 11.0 - 12.9	11.9 ± 0.28, 3 11.8 - 12.3
Length of mandibular toothrow	5.8 ± 0.60, 34 5.0 - 6.9	6.7 ± 0.69, 107 5.2 - 8.4	7.3 ± 0.25, 3 7.1 - 7.6
Length of mandible	13.3 ± 0.34, 32 12.6 - 14.2	14.8 ± 0.76, 112 8.1 - 15.8	14.9 ± 0.45, 3 14.5 - 15.4
C-C (width across canines)	5.5 ± 0.18, 23 5.3 - 6.0	6.1 ± 0.25, 69 5.7 - 6.8	5.8 ± 0.45, 3 5.4 - 6.3
M-M (width across molars)	7.3 ± 0.23, 21 6.9 - 8.0	8.0 ± 0.30, 68 7.1 - 8.7	8.0 ± 0.35, 3 7.7 - 8.4

Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.). JUJUY: Arroyo La Urbana, 45 km E y 5.4 km SE San Salvador de Jujuy, 620 m (Villa-R. and Villa-C., 1971); Finca El Remate, 24 km SE San Salvador de Jujuy, 740 m (Villa-R. and Villa-C., 1971). MISIONES: Apóstoles (Massoia et al., 1989*a*); Arroyo Urugua-í (Massoia et al., 1987); Departamento Cainguás (Massoia, 1980); Departamento Capital (Massoia, 1980); Escuela Provincial 639, Campo Ramón (Massoia, 1988*a*); Guaraní (Massoia, 1980); Los Helechos, Escuela nº 12 (Massoia et al., 1989*b*). RÍO NEGRO: Río Negro (no specific locality) (Cabrera, 1958). SALTA: Seclantás (Yepes, 1944). TUCUMÁN: Río Los Sosa, Ruta 307, km 19.7, camino a Tafí del Valle, 700 m (Mares et al., 1996) (= Playa Larga, Río Los Sosa, Ruta 307 km 19.7); Río Los Sosa, Ruta 307, km 19.7, camino a Tafí del Valle, 750 m (Mares et al., 1996) (= Playa Larga, Río Los Sosa, Ruta 307 km 19.7).

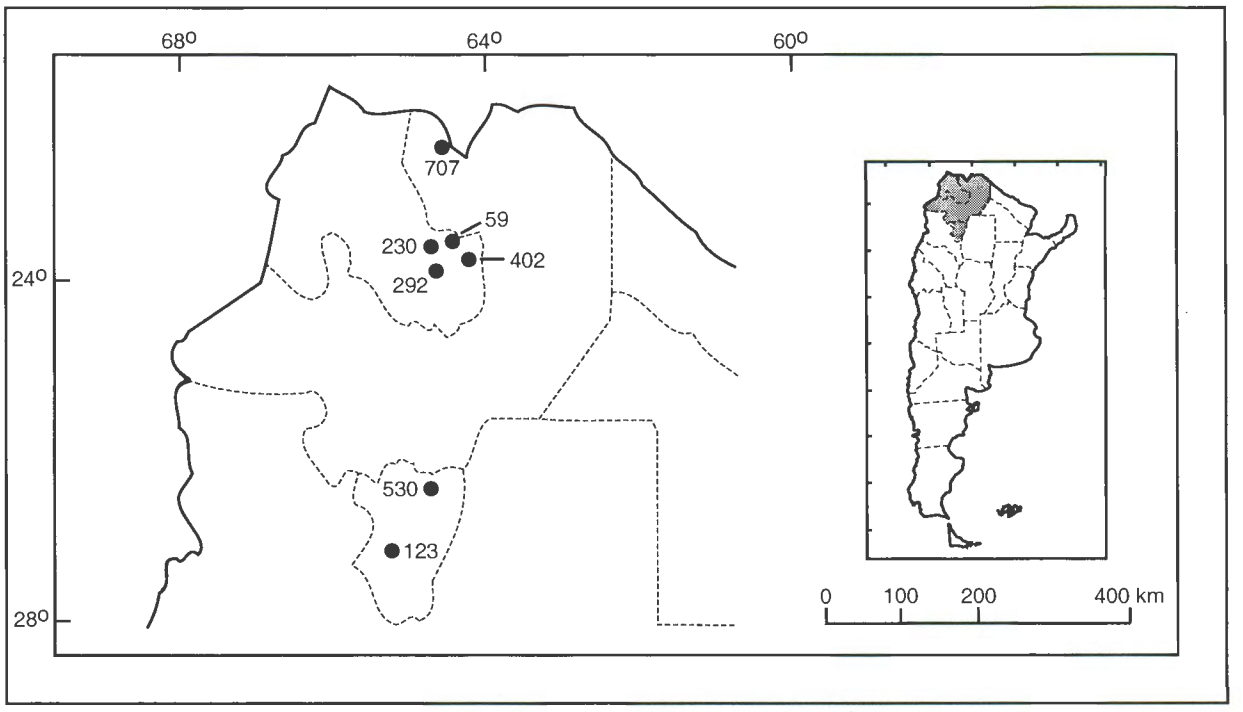


Figure 39. Map of localities of *Sturnira oporaphilum*.

Sturnira oporaphilum (Tschudi)

Ph(yllostoma) oporaphilum Tschudi, Therologie. Untersuchungen über die Fauna Peruana. Scheitlin und Zollikoter, St. Gallen, Switzerland, p. 64, 1844.

Sturnira oporaphilum: de la Torre, Unpublished Ph.D. dissertation, University of Illinos, Champaign, p. 112, 1961.

Type Locality.— Peru.

Distribution.— According to de la Torre (1961), this high-elevation species occurs from southern Peru northward into Central America and Mexico as far north as the state of San Luis Potosí. In a study of a large series of specimens from Bolivia and from regions of the northern Andes (Ecuador, Colombia, and western Venezuela), including the types of *S. ludovici*, *S. bogotensis*, and *S. oporaphilum*, Anderson et al. (1982) resolved the confusion over the taxonomy of these species from western South America. They noted that the characters of the specimens from Bolivia are similar to those of the type of *S. oporaphilum*.

Honacki et al. (1982) included this species as a synonym of *S. ludovici*, but listed records from Bolivia as probably pertaining to *S. bogotensis*. Koopman (1993) recognized the specific status of *S. bogotensis*, but mentioned that the correct name was likely *S. oporaphilum*, citing Anderson et al. (1982). Even though the identity of the different species in northern Bolivia is not completely clear, the specimens from Argentina are identical with those from Bolivia housed in the AMNH and identified as *S. oporaphilum*.

Distribution in Argentina.— Figure 39.

Description (Figs. 33c, 34c, 35c, and 40).— Generally similar to other species of the genus. Larger than *S. erythromos* and larger than *S. lilium* over most of the latter's distribution, including Argentina. Length of forearm ranges from 44 to 46.2 mm in the specimens examined. Cinnamon shoulder patches are absent. Unlike *S. lilium*, the dorsal hairs appear tricolored, with a wide dark gray or brown basal band followed by a paler one of similar size. The terminal band is narrow and the same color as the basal portion. As in *S. erythromos*, the lingual margin of the lower molars lacks vertical divisions, and the lower incisors generally are bilobed, although they may be slightly trilobed. The skull is similar to *S. lilium*. The straight upper toothrows uniquely identify this species of *Sturnira* (they are strongly curved

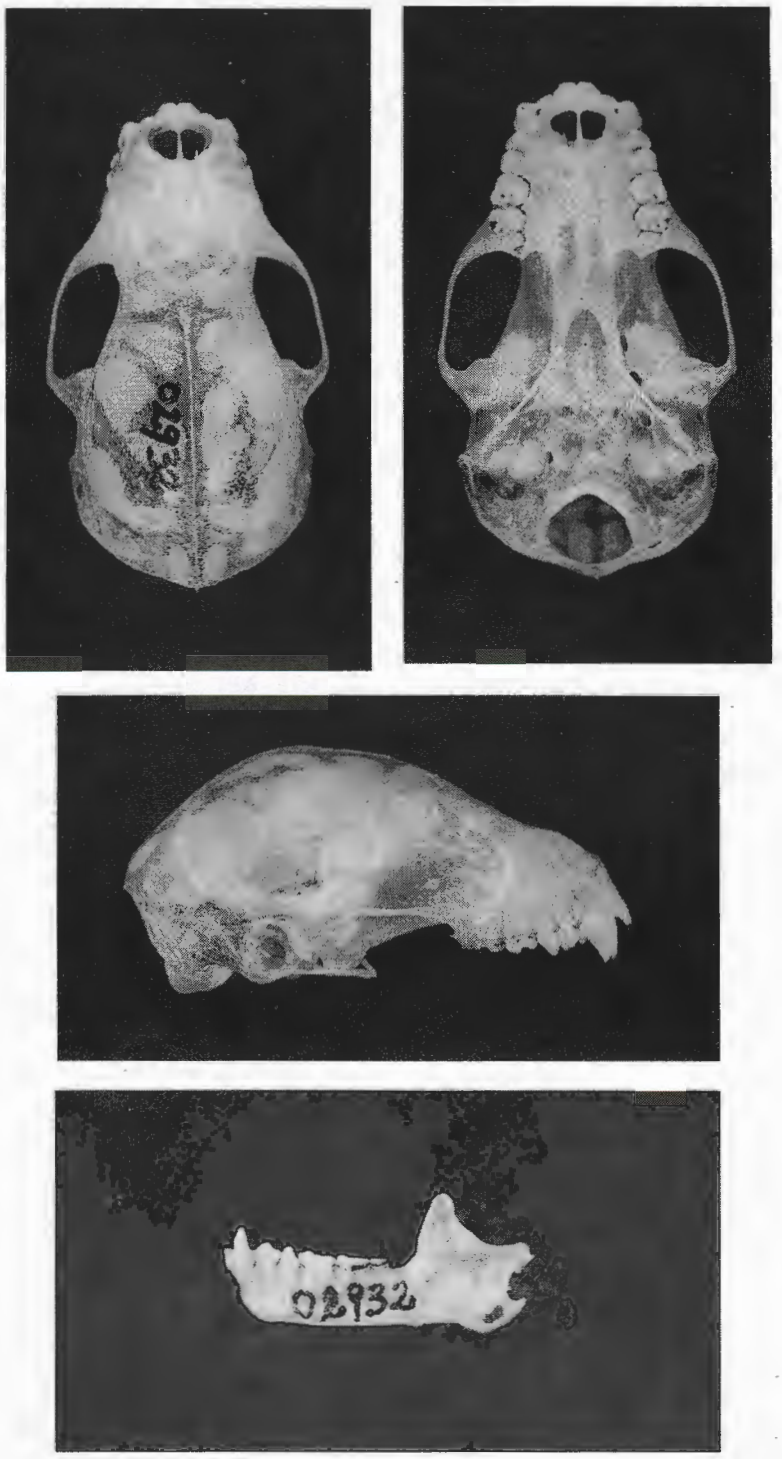


Figure 40. Skull and teeth of *Sturnira oporaphilum*. Adult female from Arroyo Sauzalito, Parque Nacional Calilegua, Jujuy Province (CML 2932). Bar = 1 cm. Teeth not to scale.

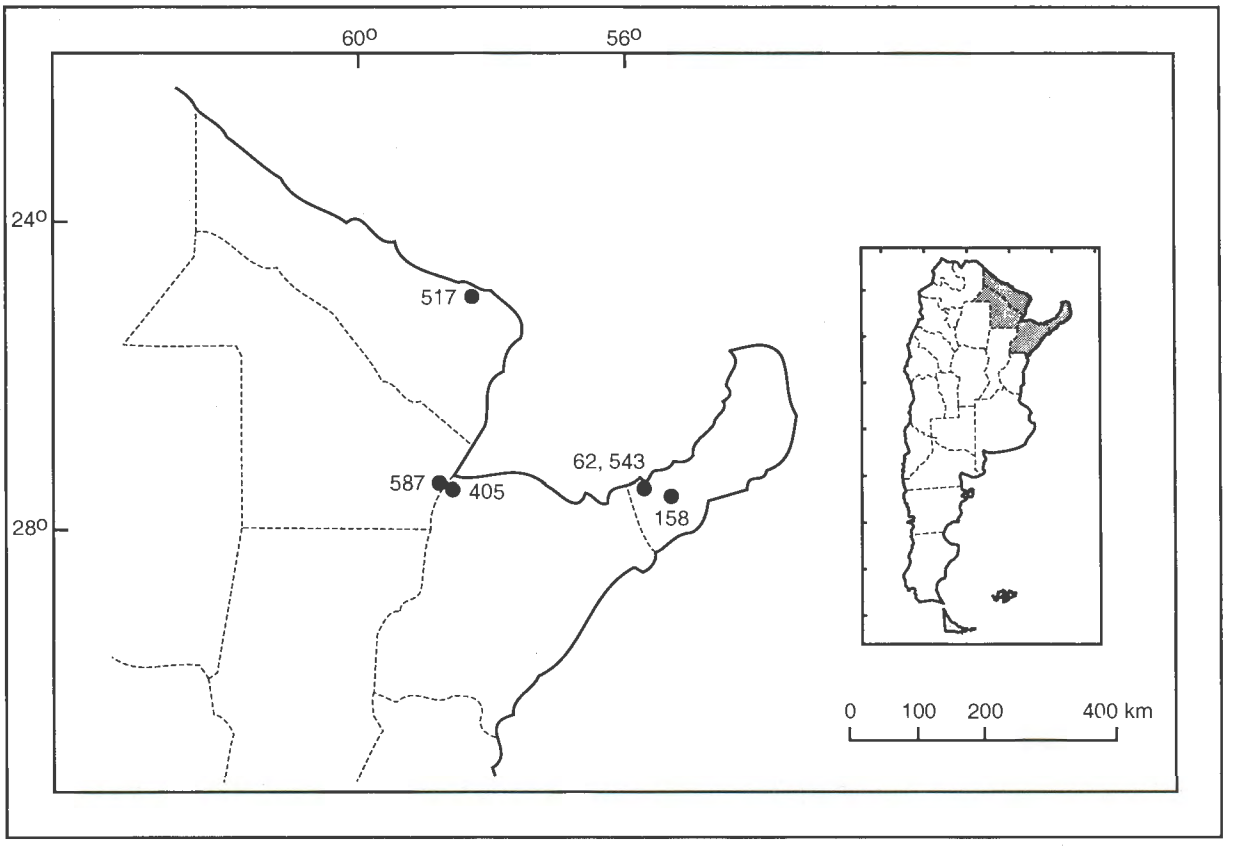


Figure 41. Map of the localities of *Platyrrhinus lineatus*.

in the other species). The rostrum is narrower than in other species of the genus and more inflated at the orbits. The anterior margin of the upper incisors is either straight or, in some specimens, slightly bilobed, unlike the other species in which the anterior margin of the incisors is rounded.

Measurements.— Table 4.

Comments.— The specimen from Tucumán Province was obtained in January and had scrotal testes; a female from Serranía de las Pavas, Salta Province, was lactating in mid-November.

Specimens Examined (7).— JUJUY: Arroyo Sauzalito, Parque Nacional Calilegua, 2 (CML); El Monolito, 1 (CML); Fraile Pintado, 12 km W, sobre Río Ledesma, 1 (MD); Laguna La Brea, 1 (OMNH). SALTA: Serranía de las Pavas, 1 (OMNH). TUCUMÁN: Casa de Piedra, Río Los Sosa, ruta 307, km 24.9, 850 m, 1 (OMNH).

Additional Records.— TUCUMÁN: Piedra Tendida, 12 km WNW Burruyacú along Río Cajón, 2,500 ft. (Mares et al., 1996).

Genus *Platyrrhinus*

Platyrrhinus lineatus (É. Geoffroy St.- Hilaire)

Phyllostoma lineatum É. Geoffroy St.- Hilaire, Annales du Muséum d'Histoire Naturelle, Paris, 15:180, 1810.

Platyrrhinus lineatus: Saussure, Revue et Magasin de Zoologie, serie 2, 12:429, 1860.

Jones and Carter (1976) considered this species to be monotypic, but Koopman (1976) included *Vampyrops* (= *Platyrrhinus*) *nigellus* as a subspecies of *P. lineatus* based on cranial similarities. Later, Anderson et al. (1982) listed both subspecies (*P. l. lineatus* and *P. l. nigellus*) in Bolivia where they do not occur in sympatry. Gardner and Ferrell (1990) clarified the no-

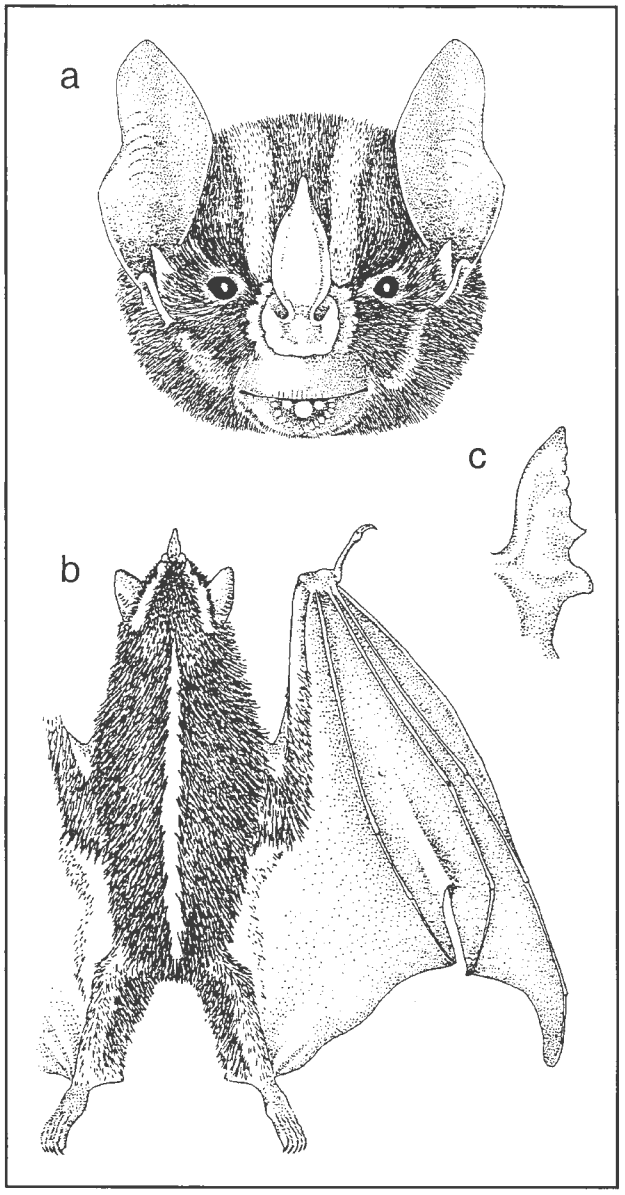


Figure 42. *Vampyrops lineatus*: (a) face; (b) dorsal view; and (c) tragus.

menclatural status of this species. The Argentine subspecies is *P. l. lineatus*.

Type Locality.— Paraguay, Asunción.

Distribution.— This species is found from in northern Colombia, French Guiana and Suriname through Ecuador and central Peru to north-central Bolivia, thence to the Brazilian coast and southward to eastern Paraguay, northeastern Argentina, and northern Uruguay (modified from Koopman, 1993).

Distribution in Argentina.— Figure 41.

Description (Figs. 42 and 43).— Size is medium, slightly larger than *S. lilium*, with the length of the forearm between 45 and 50 mm. The prominent mid-dorsal stripe is not found in any other Argentine phyllostomid. Only *Noctilio* has a similar stripe. In *Platyrrhinus* the stripe is pale colored, generally white, and extends from between the ears to the base of the tail. In some specimens it is very pale and not clearly evident, but it is always present. Two pairs of facial stripes are normally present. The supraorbital stripe extends from the upper side of the nose leaf to the internal margin of the ear. The suborbital stripe extends from the posterior margins of the lips to the ear. The specimens from Chaco Province are light brown, with the tips of the hairs slightly darker, the venter paler, and the hairs unicolored. Specimens from Paraguay, Departamento Paraguarí, are slightly grayer and the dorsal line is immaculate white, whereas in those from Chaco Province it is yellowish or cream. The eyes are surrounded by dark, almost black, hairs producing a characteristic eye ring. The tragus is yellow; in French Guiana, Brosset and Charles-Dominique (1990) reported the tragus color as pink. The membranes are very dark brown or black. The hair extends dorsally a little beyond the proximal half of the forearm, over one-half of the propatagium, over the tibia, and over the uropatagium. Ventrally the hair is distributed as on the dorsum, but completely covers the propatagium and slightly more of the forearm and the plagiopatagium. The nose leaf is of medium size, with the basal margin free and surrounded by small glands; it is lanceolate with a widened median keel. The ear has a convex inner margin; the upper half of the external margin is straight and the lower half is convex and ends in a small antitragus that is wider than it is tall. The calcar and uropatagium are reduced; the uropatagium is bordered by a dense fringe of hairs. There is no tail.

The skull is robust and, in profile, is elevated in the mid-braincase, where the sagittal crest is evident; over the rest of its length the sagittal crest is less pronounced. The rostrum is short, its length little more than one-half of the length of the braincase. Zygomatic arches are well developed, thin, but with a paraorbital process slightly widened on the posterior one-half. The postorbital constriction is wide and almost equals the width of the least interorbital constriction. The palate is narrow anteriorly and widened at the level of the last mo-

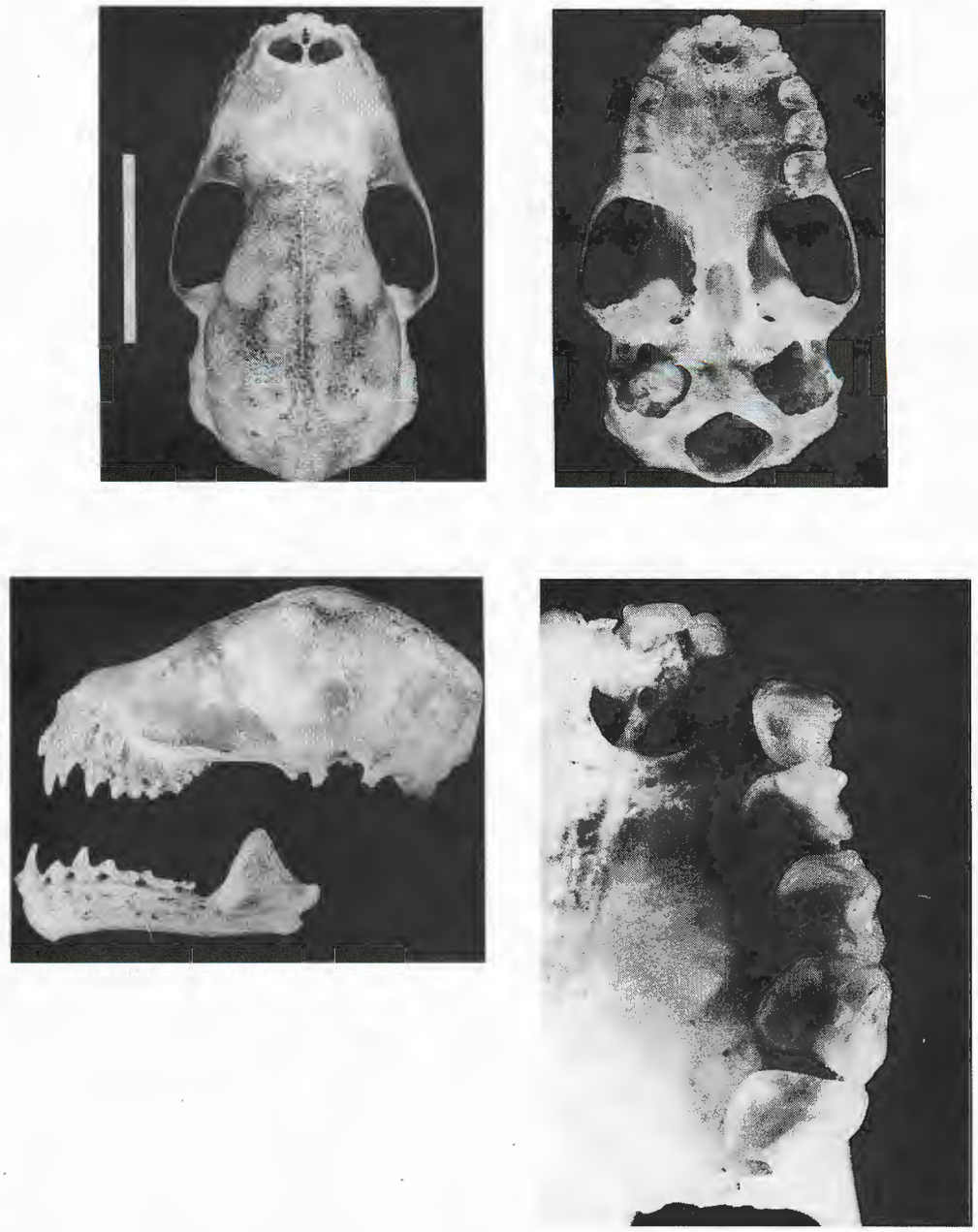


Figure 43. Skull and teeth *Platyrrhinus lineatus*. Adult female from Resistencia, Chaco Province (CML 1813). Bar = 1 cm. Teeth not to scale.

lars; its posterior margin is smooth, arched, and without a caudal spine. The hamular process of the pterygoids is thin. The basisphenoidal pits are shallow and almost indistinguishable.

The dental formula is I 2/2, C 1/1, P 2/2, M 3/3, total 32. The I1 is well developed and more than twice the size of I2, which is reduced to a few barely visible simple spicules. The first upper incisors are separated at the base but in contact at the tips. The I2 is separated from both I1 and the canines, but in specimens from areas other than Argentina can be in contact with them and fill the intervening space. The canines are normal,

slightly recurved, and sharply pointed. The P1 is small, slightly more than one-half the size of P2, and with its anteriormost point extending over the posterior projection of the cingulum of the canine. The P2 is separated from P1 by a small but visible space; the paracone is well developed and the mesostyle is low, giving the appearance of a spicule in the posterior labial region of the premolar. The M1 and M2 are well developed; M3 is reduced. The cusps of M1 and M2 are laterally compressed, giving the appearance of a cutting blade divided into two lobes (one anterior and the other posterior) whose points correspond, respectively, to the parastyle and metastyle. The protocone and the hypocone are greatly reduced. The i1 and i2 are small and slightly bilobed; a small space separates the first lower incisors; i2 is in contact with the lower border of the cingulum of the canine. The canines are normal. The p1 is smaller than p2. The m1 and m2 are very low crowned. The anterior edge of m1 is pointed, with the cusps of the trigonid grouped together; posteriorly, only the entoconid is visible. The anterior margin of m2 is straight due to the alignment of the protoconid and metaconid and the position of the entoconid on the lingual side of the posterior margin of the molar. The m3 is greatly reduced and lacks differentiated cusps.

Measurements.— Table 5.

Comments.— Although the diet of *P. lineatus* includes primarily fruit, Ruschi (1953) found moths of the Family Sphingidae in stomachs. Sazima (1976) observed this species feeding on nectar of the flowers of *Musa acuminata* and *Lafoensia pacari*. Willig (1983) noted a strong tendency to feed on the fruit of *Vismia*. Males often maintain small harems of 7 to 15 females, and each harem occupies a different roost (Willig, 1983). Little is known about reproduction. Gonzalez and Vallejo (1980) found pregnant females in early February and late March (the latter with two near-term fetuses). Brosset and Charles-Dominique (1990) noted that this species is rare; it is known from Suriname and French Guiana from only a single specimen in each country. It was first reported for Argentina in 1966 (Fornes and Massoia, 1966).

Specimens Examined (11).—CHACO: Resistencia, 5 (1 CML, 3 MACN, 1 TCWC). CORRIENTES: Laguna Paiva, B° Las Lomas, 2 (1 CML, 1 OMNH). MISIONES: Colonia Mártires, 1 (MACN); Posadas, 3 (MACN).

Additional Records.— FORMOSA: Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.). MISIONES: Arroyo Zaimán (Massoia, 1980); Departamento Capital (Massoia, 1980).

Genus *Vampyressa*

Vampyressa pusilla (Wagner)

Phyllostoma pusillum Wagner, Abhandlungen der Mathem.-physikaliscchen Classe der Königlich Bayerischen Akademie der Wissenschaften, Muenchen, 5:173, 1843.

Vampyressa pusilla: Miller, Bulletin of the United States National Museum, 57:156, 1907.

Type Locality.— Brazil, Rio de Janeiro, Sapitiba.

Distribution.— The genus contains five species in South America (Koopman, 1993), only one of which, *V. pusilla*, is found in Argentina. This species occurs (modified from Koopman, 1993) from southern Mexico to Bolivia and northeastern Argentina.

Distribution in Argentina (Fig. 44).— In Argentina, this species is known only from a single specimen from the province of Misiones.

Description (Figs. 45 and 46).— Body size is medium. Dorsal coloration is pale brown, and the dorsal hairs are tricolored, with a medium band that is paler than the bases and or the tips. The ventral hairs are a unicolored light brown. The most distinctive features of this species are the white facial stripes, and the bright yellow color on the tragus and on the borders of the ears. There is no mid-dorsal stripe. The uropatagium is narrow, and the calcars are very short.

The dental formula is I 2/2, C 1/1, P 2/2, M 2/2, total 28. The upper incisors are well separated from one another. I1 is more than twice as large as I2. The cutting edges of I1 are not bifid in the specimen examined. The canine is of normal shape, with the cingulum well developed posteriorly and almost in contact with the anterior surface of P1. The P1 has a single cusp and is about one-half the size of the P2. P2 is separated from both P1 and M2 by diastemas; P2 has two cusps—a well-developed and high paracone, and a lower mesostyle. The labial cusps of the upper molars are elevated forming a cutting edge; the lingual cusps are less developed, but extend labially to form a platform. Lower

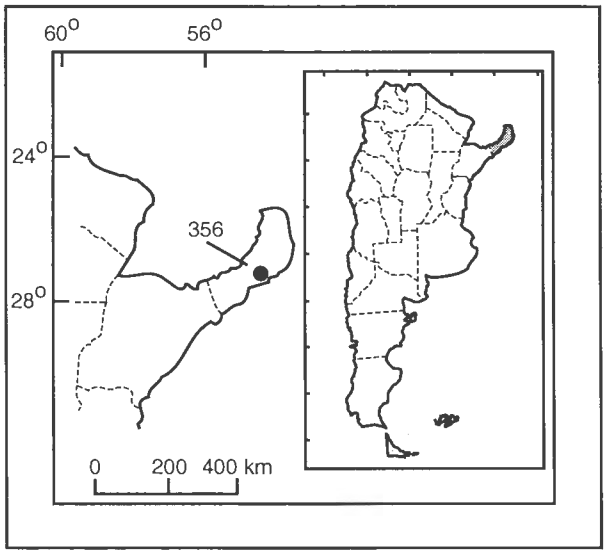


Figure 44. Map of the localities of *Vampyressa pusilla*.

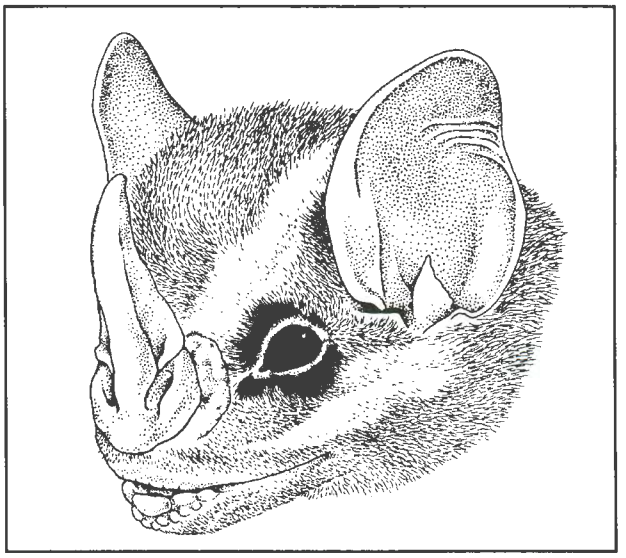


Figure 45. Face of *Vampyressa pusilla*.

incisors are subequal in size, are clearly bifid, and completely fill the space between the canines. The p1 is smaller than the p2, and both have only one cusp. The m1 has a well-developed protoconid and hypoconid. In m2, the paraconid and entoconid are better developed than are the labial cusps.

The skull is fairly elongate, with the rostrum short in comparison with the braincase. The sagittal crest is reduced, and is barely visible at the mid-point between the orbits.

Measurements.— Table 5.

Comments.— Since only one specimen has been captured, little is known of the biology of this species in Argentina. The specimen, a male with testes measuring 3 X 4 mm, was captured over a stream in rain forest habitat in the summer month of December (Mares et al., 1995). Interestingly, Brosset and Charles-Dominique (1990) also captured the first specimens of this species for French Guiana, and these were taken in both undisturbed and experimentally disturbed rain forest. Handley (1976) reported information on habitat and other aspects of the biology of this species in Venezuela, and its biology across its geographic range was reviewed by Lewis and Wilson (1987).

Specimens Examined (1).— MISIONES: Jct. Hwy 21 and Arroyo Oveja Negra, approx. 2 km W Parque Provincial Moconá, 1 (CML).

Genus *Artibeus*

Three species of this genus occur in Argentina: *Artibeus planirostris* in the Northwest, and *A. fimbriatus* and *A. lituratus* in the Northeast. *A. planirostris* from Argentina has been treated previously both as *A. jamaicensis* and *A. lituratus*. We follow Barquez et al. (1993) in including *A. fimbriatus* in Argentina. The specimens of *A. fimbriatus* are coincident in their characters those listed by Myers and Wetzel (1983) as "cf. *fimbriatus*," with others deposited in the USNM, and with specimens at the BMNH that are identified as the "probable" type and paratypes of *A. fimbriatus*.

The taxonomy of the South American species in this genus is complicated and unresolved (Andersen, 1908; Davis, 1970, 1984; Handley, 1987, 1989, 1991; Jones and Carter, 1979; Patterson et al., 1992). Little is known about individual and population variation of the different species. For example, the validity of some characters, such as the presence or absence of the small M3, are questionable. Myers and Wetzel (1979) indicated that it is easy to distinguish *A. jamaicensis* from Paraguay from *A. lituratus* and *A.* sp. (probably *fimbriatus*) based on its smaller size and the presence of M3; the latter two species have only two upper molars on each side. In *A. jamaicensis* from Bolivia, the M3 is present or absent, while in *A. lituratus* it is always absent, and in *A. planirostris* it is always present (Anderson et al., 1982). In *A. planirostris* the M3 is generally present,

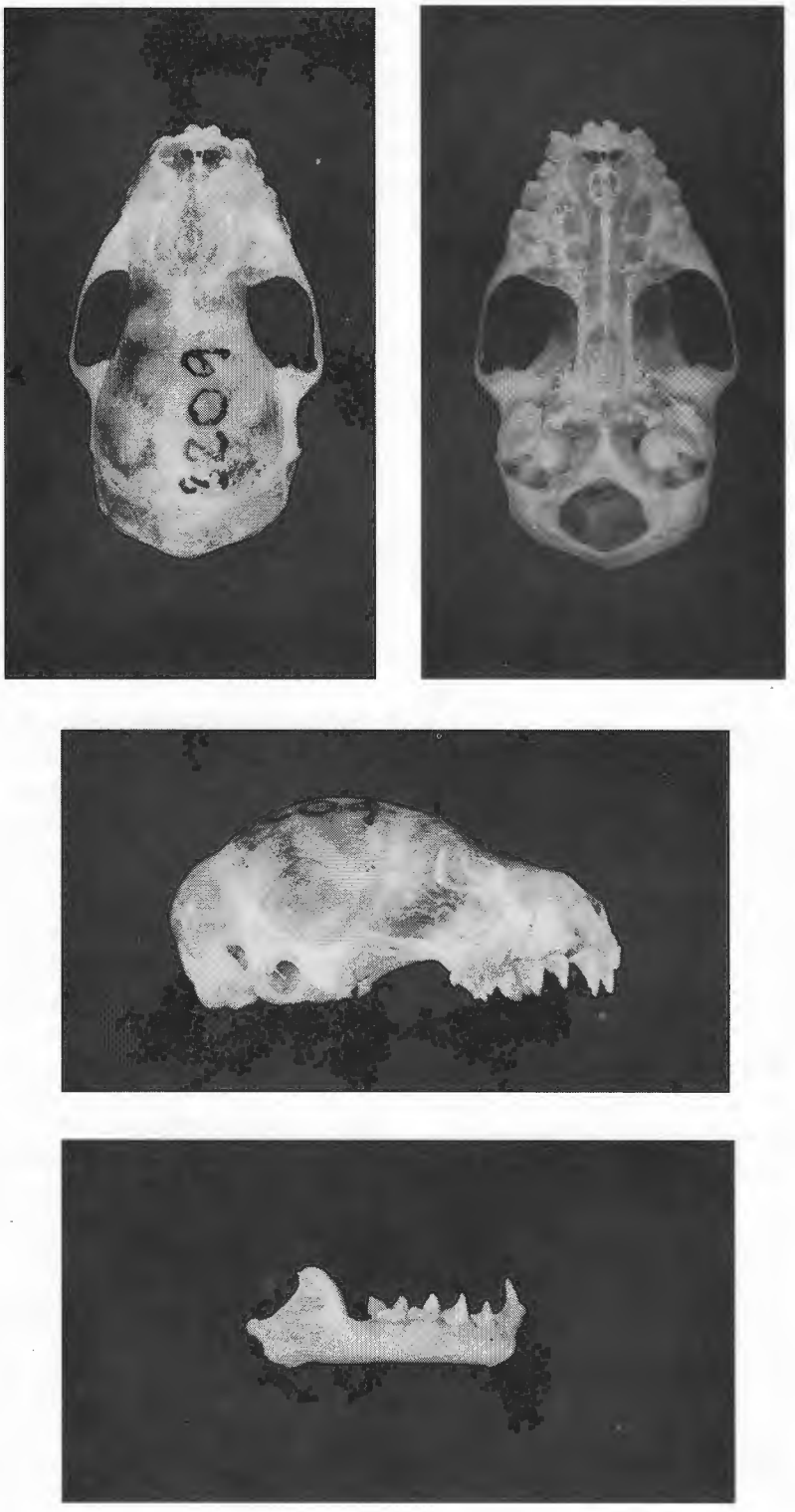


Figure 46. Skull and teeth of *Vampyressa pusilla*. Adult male from Jct. Hwy 21 and Arroyo Oveja Negra, approx. 2 km W Parque Provincial Moconá, Misiones Province (CML 3209).

Table 5. Measurements of Platyrrhinus lineatus, Vampyressa pusilla, *and* Pygoderma bilabiatum. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Platyrrhinus lineatus*	*Vampyressa pusilla*	*Pygoderma bilabiatum*
Total length	75.2 ± 6.87, 5 63.0 - 79.0	55.0, 1	68.2 ± 10.69, 19 53.0 - 84.0
Hindfoot length	11.2 ± 2.34, 5 8.0 - 14.2	17.0, 1	10.2 ± 2.77, 22 6.0 - 13.9
Ear length	16.2 ± 2.44, 5 13.0 - 19.0	9.0, 1	17.7 ± 2.23, 21 15.0 - 21.5
Forearm length	47.1 ± 1.63, 6 45.8 - 50.0	34.5, 1	40.2 ± 1.73, 24 36.0 - 44.2
Weight	27.8 ± 3.25, 3 24.5 - 31.0	15.0, 1	20.4 ± 2.61, 8 18.0 - 26.0
Condylobasal length	22.8 ± 0.28, 3 22.7 - 23.2	18.9, 1	18.0 ± 0.49, 13 17.1 - 19.0
Least interorbital breadth		5.5, 1	7.3 ± 0.37, 14 6.4 - 8.0
Zygomatic breadth	14.5 ± 0.40, 3 14.2 - 15.0	12.1, 1	14.1 ± 0.48, 10 13.3 - 14.7
Greatest length of skull	25.4 ± 0.30, 3 25.2 - 25.8	20.2, 1	20.5 ± 0.60, 14 19.3 - 21.7
Postorbital constriction	6.3 ± 0.11, 3 6.2 - 6.4		7.7 ± 0.18, 20 7.4 - 8.0
Breadth of braincase	10.8 ± 0.00, 3 10.8 - 10.8	9.1, 1	10.4 ± 0.12, 14 10.3 - 10.7
Length of maxillary toothrow	9.1 ± 0.30, 3 8.8 - 9.4	6.5, 1	6.0 ± 0.17, 20 5.5 - 6.3
Palatal length	11.7 ± 0.75, 3 11.0 - 12.5	9.1, 1	6.5 ± 0.27, 18 6.0 - 7.1
Mastoidal breadth	12.6 ± 0.10, 3 12.5 - 12.7	9.3, 1	12.4 ± 0.33, 13 12.0 - 13.0
Length of mandibular toothrow	8.5 ± 0.15, 3 8.4 - 8.7	7.4, 1	4.6 ± 0.48, 18 4.3 - 6.5
Length of mandible	17.2 ± 0.41, 3 16.8 - 17.6	13.2, 1	12.7 ± 0.30, 20 12.1 - 13.5
C-C (width across canines)	6.3 ± 0.11, 3 6.3 - 6.5	5.2, 1	6.4 ± 0.21, 17 6.1 - 6.8
M-M (width across molars)	10.5 ± 0.05, 3 10.5 - 10.6	8.5, 1	7.8 ± 0.50, 20 6.4 - 8.5

but can be absent, whereas in *A. lituratus* it is always absent (R. M. Barquez, personal observation). Obviously this character varies in two of the species. Although there is a trend toward the presence or absence of M3 in each of these species, the alternative state should not be a sufficient reason to treat a specimen as belonging to a different species. Consider, for example, *A. fimbriatus* from Paraguay and Argentina. In all specimens examined, the small M3 is lacking, whereas in the skull of the paratype from the BMNH it is clearly evident. The presence or absence of this molar should always be used with additional characters in identification.

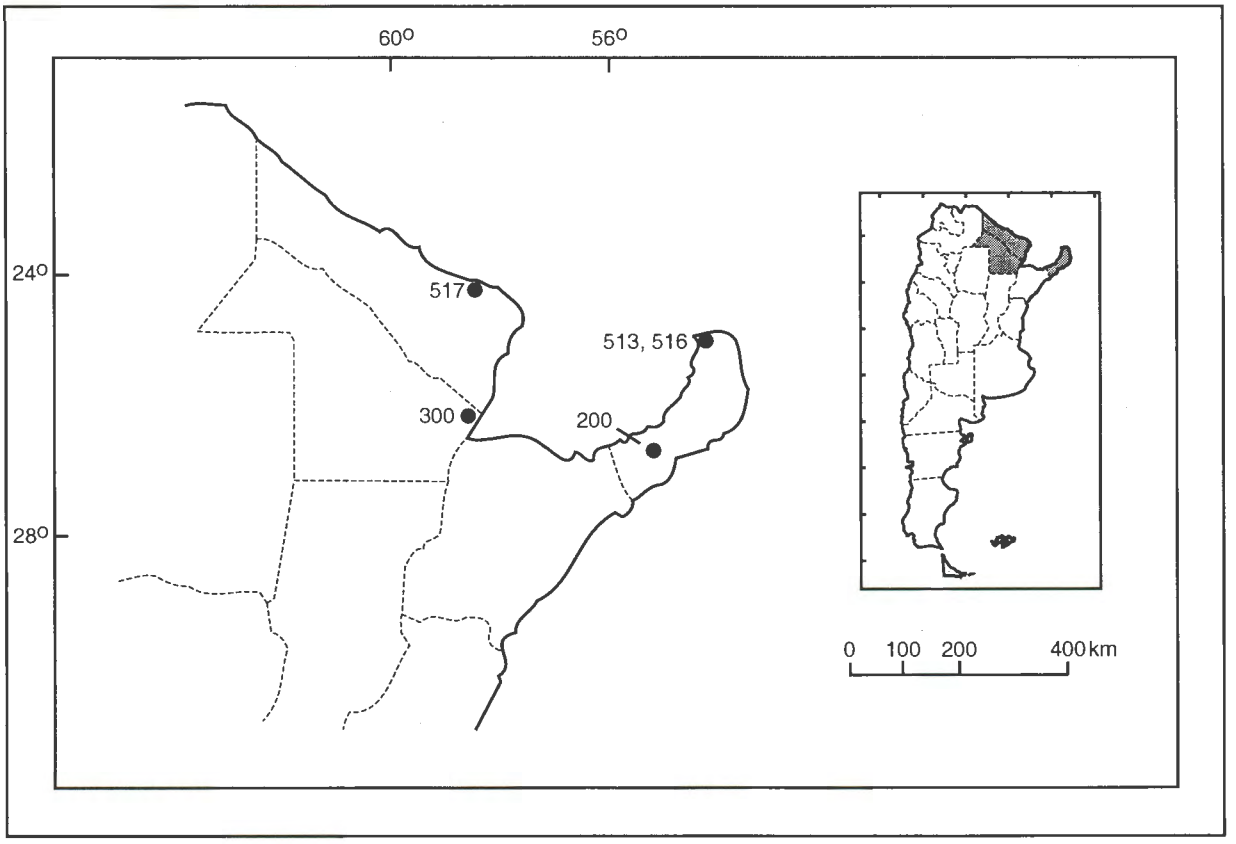


Figure 47. Map of the localities of *Artibeus fimbriatus*.

entre paréntesis Gray

Artibeus fimbriatus Gray

Artibeus fimbriatus Gray, Magazine of Zoology and Botany, 2:487, 1838.

This species is known from the provinces of Chaco, Formosa, and Misiones, occurring within the range of *A. lituratus*. The decision to assign these specimens to *A. fimbriatus* was based on comparisons with the "probable" type and paratypes from the BMNH, as cataloged by J. E. Hill, and on conversations with C. O. Handley, Jr., regarding the identity of the species in South America. Handley (1989) redescribed and commented on the taxonomy of this species.

Type Locality.— Brazil, in accordance with the original citation but without further data. The labels of the specimens from the BMNH do not have the locality, but see Handley (1989).

Distribution.— Brazil and Paraguay (Myers and Wetzel, 1979, 1983; Handley, 1989).

Distribution in Argentina.— Figure 47.

Description (Fig. 48).— Characters are similar to those of *A. lituratus*, but it can be distinguished by poorly marked or absent facial stripes, a smaller (< 67 mm) forearm (> 70 mm in *A. lituratus*), and a uropatagium and feet that are not covered by hairs on the dorsal side. Color is generally darker than *A. lituratus*, but some specimens can be similarly colored. The specimen from Parque Nacional Iguazú is almost black and the bases of the dorsal hairs are dark gray.

The dental formula is I 2/2, C 1/1, P 2/2, M 2-3/3, total 30-32. The skull is similar in size to that of *A. lituratus*; unlike *A. lituratus*, the orbital processes are usually absent or weakly developed and the width of the interorbital is greater. In general, the skull is very similar to *A. planirostris* from northwestern Argentina, but in *A. fimbriatus* the width of M2 is greater than 4.0 mm, whereas in *A. planirostris* it is less than 3.6 mm. Despite the variability of this character, M3 is absent in

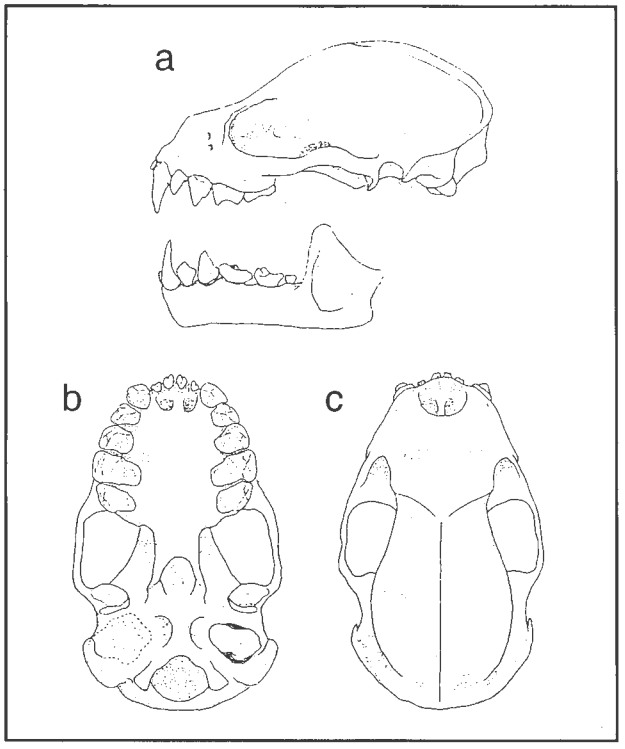


Figure 48. Skull of *Artibeus fimbriatus*. Drawn from an adult male from Dos de Mayo, Misiones Province (CML).

all specimens of *A. fimbriatus* examined from Paraguay and Argentina, whereas it is present in all but one of the *A. planirostris* examined.

Measurements.— Table 6.

Comments.— Little is known about the biology of this species.

Specimens Examined (8).— CHACO: General Vedia, 1 (MACN). MISIONES, Dos de Mayo, 5 (CML); Parque Nacional Iguazú, 1 (CML); Parque Nacional Iguazú, palmital en ruta 107, 1 (CML).

Additional Records.— FORMOSA: Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.).

Artibeus lituratus (Olfers)

Phyllostomus lituratus Olfers, Bemerkungen zu Illiger's Ueberblick der Säugethiere nach ihrer Vertheilung uber die Welttheile, rücksichtlich der Südamerikanischen Arten (species) (Abhandlung 10 of Wilhelm Ludig Eschwege's Journal von Brasilien..., vol. 15, heft 2 of the "Neue Bibliothek des wichtigsten Reisenbeschreibungen zur Erweiterung der Erd und Volkerkunde..." edited by F. T. Bertuch, Weimar, p. 224, 1818.

Artibeus lituratus: Thomas, Annali di Museo Civico di Storia Naturale di Genova, ser. 2, 20:547, 1900.

Type Locality.— Paraguay, Asunción.

Distribution.— *Artibeus l. lituratus* occurs in southeastern Peru, Bolivia, southern Brazil, Paraguay, and northeastern Argentina.

Distribution in Argentina (Fig. 49).— All previous citations of this species in northwestern Argentina are incorrect. The records of *A. lituratus* of Fornes and Massoia (1967) for Chaco Province and Barquez (1984*a*) for Dos de Mayo, Misiones Province, correspond to *A. fimbriatus*.

Description (Figs. 50 and 51).— Size is large and, along with *Chrotopterus auritus*, *Noctilio leporinus*, *Eumops perotis*, and *Eumops dabbenei*, this is one of the largest bats in Argentina. The length of the forearm generally is greater than 70 mm. The pelage is soft and long, dorsally dark gray or dark brown with reddish tints; bases of the hairs are generally lighter than the tips. Ventrally, the hairs are generally unicolored and the same shade as the tips of the dorsal hairs, but in most specimens they have strong reddish hues. Dorsally, the pelage extends to the sides of the plagiopatagium, over more than half of the forearm, over more than one-half of the uropatagium, and over the legs and toes. Ventral distribution of hairs is similar to the dorsum, but it also extends over the propatagium, although the hairs are fine and sparse; the propatagium is practically naked on the dorsal side; a fine fringe of hairs borders the uropatagium and a tuft is located at the base of the thumb. The pronounced facial stripes that characterize this species distinguish it from the other two species of *Artibeus*. The nose leaf is wide and well developed, its basal margins free; a series of glands give the rostrum an inflated appearance. The lower lip has a large central wart surrounded by a variable number of smaller warts; generally, a small wart is located below the central one, from which a series of six to eight papillae extend from the lip to the side of the mouth; above the

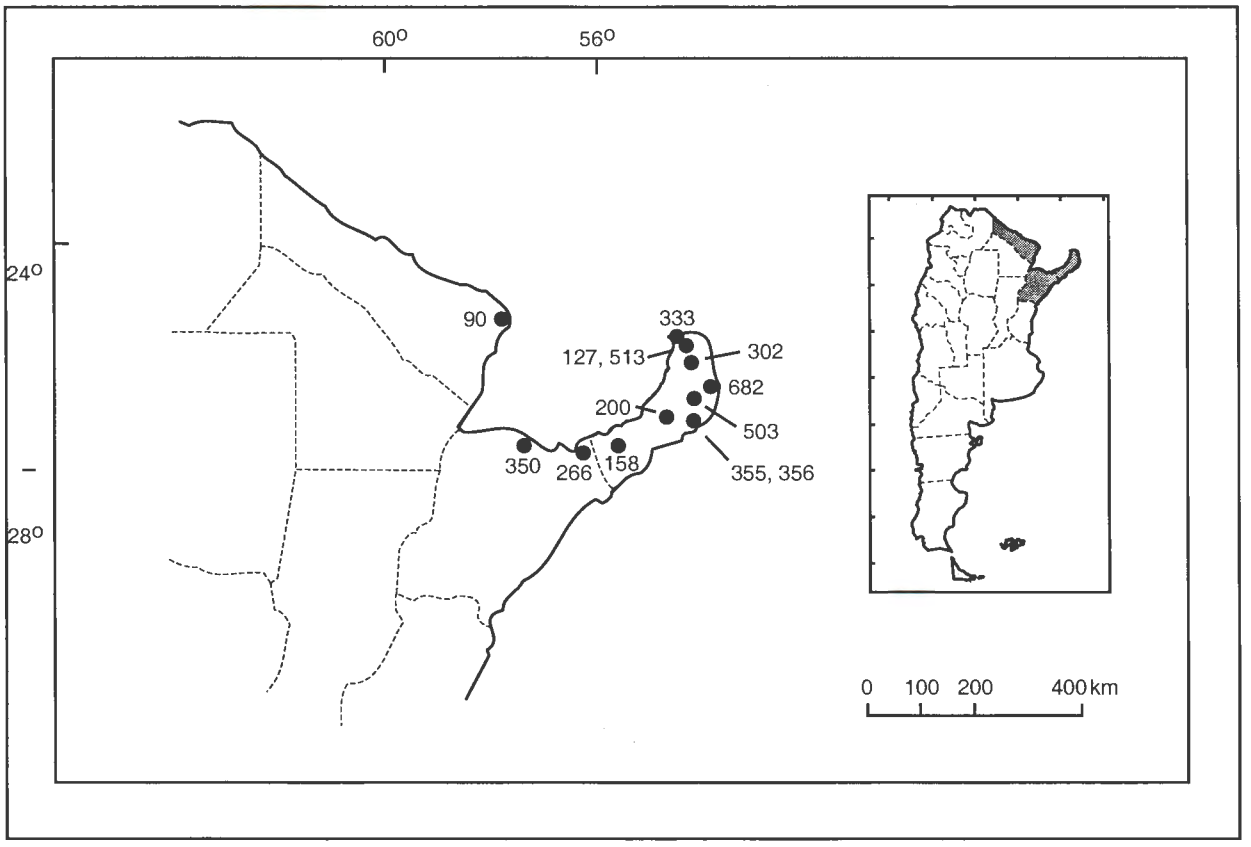


Figure 49. Map of the localities of *Artibeus literatus*.

central wart at each side is a smaller and rounded papilla. The upper lip also is bordered by small papillae, which become smaller from the center toward the corners of the mouth; they are not grouped as on the lower lip. Ears are shorter than the head and rounded, their external upper margin is straight and the inferior margin is convex. Internally, the ears have parallel furrows which vary in number; the tragus is well developed with crenulations on its external margin and an almost square basal lobule. In most specimens the tip of the tragus is strongly yellow. The tail is absent. The feet are well developed and the claws long and curved; the calcar is slightly shorter than the length of the foot with the claws. Wing membranes are very wide and their tips are white or cream colored; the plagiopatagium is united to the foot at the metatarsus.

The skull is rounded, wide, and flattened, and the rostrum is shorter than the braincase. Supraorbital ridges are strongly developed with pre- and postorbital processes evident; generally the postorbital process ends in a very sharp point, especially in males, whereas the preorbital process is not always so pronounced. The postorbital constriction is narrow compared to other *Artibeus*, such that the braincase becomes narrower toward the orbits. In lateral view, the braincase becomes abruptly elevated at the level of the postorbital process. The zygomatic arches are heavy, laterally compressed, and slightly arched; they have well-defined postorbital processes, such that in lateral view each arch has a medial constriction. The sagittal crest is present and is generally more prominent in adults, especially males. The palate is wide and has a posterior tubular prolongation; the border of the palate is semicircular and the caudal spine of the palatine is absent; hamular processes of the pterygoids are short, but extend to meet the internal margin of the glenoid fossa. Post-tympanic and paraoccipital processes are well developed and the tympanic bullae are small.

The dental formula is I 2/2, C 1/1, P 2/2, M 2/3, total 30. The inner upper incisors are ovoid, their cutting edges bilobed and in contact with one another at the tip. The I2 is bladelike and barely extends to the

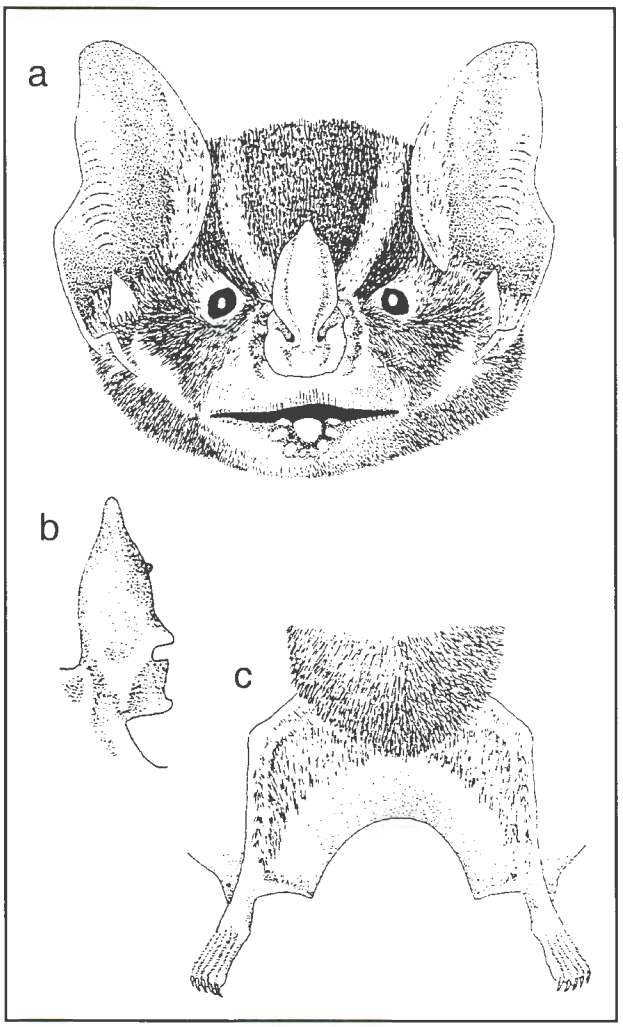


Figure 50. *Artibeus lituratus*: (a) face; (b) tragus; and (c) uropatagium.

cingulum of the canine. The upper incisors completely fill the space between the canines. The canines are generally not distinctive, although there is a small canal on the internal face between two crests. The P1 is about one-half as high as the canine; the posterior border of P1 is sharp and the tooth is about one-half the size of P2; the mesostyle is small and barely visible as a low cusp oriented toward the labial side of the toothrow and in contact with the anterior margin of P2. The P2 is much like P1, but has an internal platform (talon) supporting a small protocone on its anterolingual margin. Viewed from above, the M1 is triangular and positioned with its base toward the labial side and its tip toward the lingual side; it is wider than long, with the talon expanded over the bony palate; the paracone and metacone are the main cusps and the former is higher; the protocone and hypocone are well developed, the former positioned in the anterolingual margin of the talon, and the latter also located on this margin, but lower. Several specimens have a series of wrinkles and folds on the platform between the external and internal cusps. The M2 is smaller than M1 and, although it has the same cusps, they are less developed and its shape is ovoid.

Both i1 and i2 are small, subequal in size, and fill the space between the canines completely; they may be bilobed, but this is variable. Canines are well developed, but the cingulum is hardly visible. The p1 is small, triangular in lateral view, and has only one well-developed cusp (protoconid). The p2 is much higher than the other molariform teeth, and its anterolingual margin has a small paraconid and a well-developed protoconid; a small hypoconid is present toward the external margin and almost in contact with the anterior extreme of m1. The m1 is longer than wide, with its anterior margin rounded and its posterior almost straight; the protoconid and hypoconid are clearly visible, the first larger than the second; a well-developed anterior metaconid and a low entoconid are aligned on the lingual margin. The m2 is smaller, almost square; the entoconid is displaced lingually forming a circular border that continues posteriorly; the hypoconid is almost absent; metaconid and entoconid are well developed; an apparent paraconid is located between the protoconid and metaconid. The m3 is small and rounded, with poorly differentiated cusps.

Measurements.— Table 6.

Comments.— *Artibeus lituratus* inhabits the eastern forests, taking shelter principally in the foliage of tall trees, but also in caves and rock fissures. In French Guiana, Brosset and Charles-Dominique (1990) also found this species to be common in forested habitats. Its diet consists mainly of fruit, but also includes other plant parts, such as leaves and flowers; some authors have reported insects (Gardner, 1977*a*). At least 67 different species of plants have been identified in the stomachs of this species throughout its distribution (Gardner, 1977*a*). The stomachs of various specimens contained unidentified fruit and seeds (R. M. Barquez, personal observation). In Iguazú, Misiones Province, this species feeds not only on wild fruits, but also on cultivated fruits, such as bananas and mangoes (Crespo, 1982). Brosset and Charles-Dominique (1990) reported this species feeding in flocks on large fruit trees.

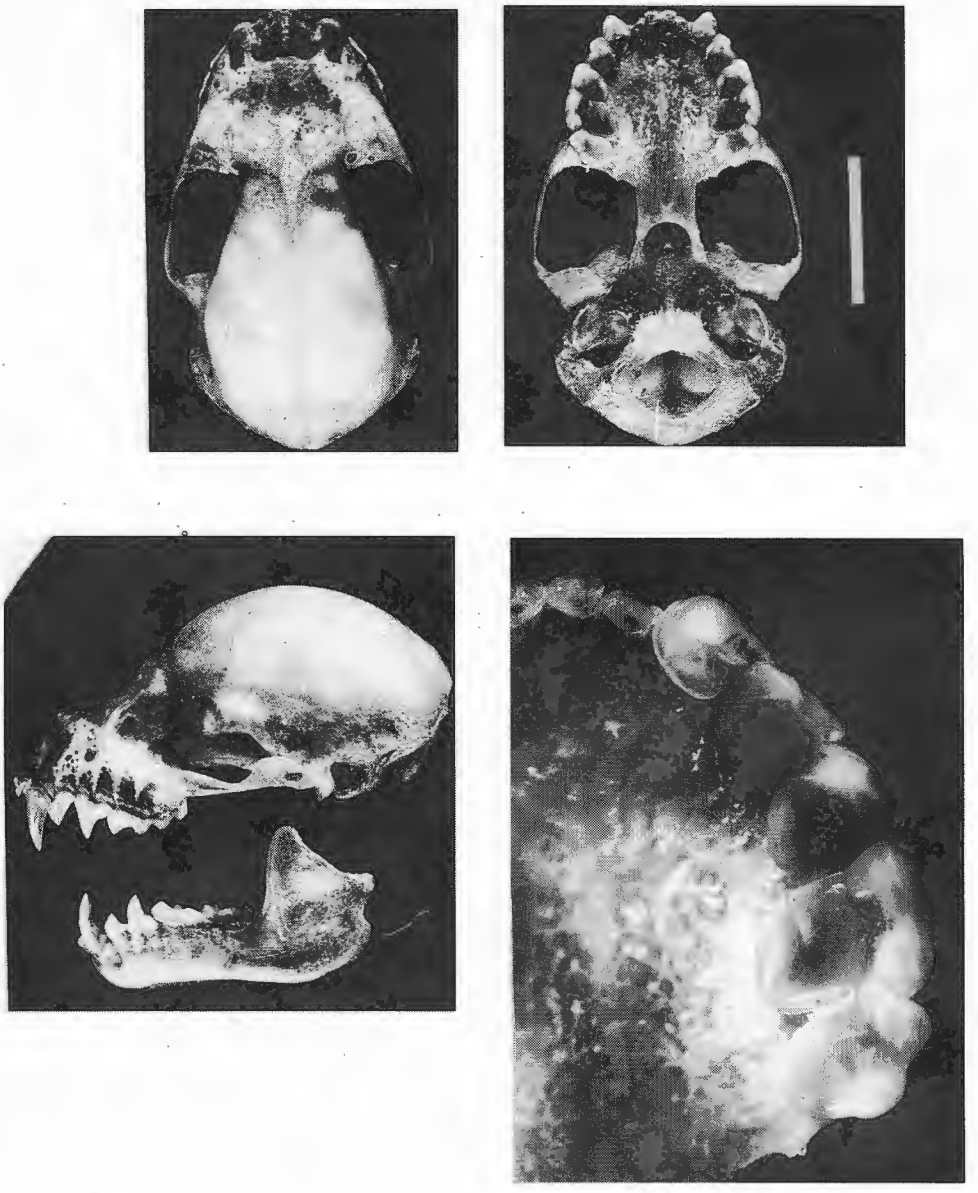


Figure 51. Skull and teeth of *Artibeus literatus*. Adult male from Paraje Paraíso, Misiones Province (CML 2172). Bar = 1 cm. Teeth not to scale.

Wilson (1979) summarized what is known about reproduction. He noted that it can reproduce all year, although in the northern part of its distribution only one young is produced yearly, whereas towards the south reproductive activity is less protracted. Crespo (1982) observed reproductive activity in Parque Nacional Iguazú between September and February, and pregnant females were found between November and February; he also noted that males were captured more frequently than females.

Specimens Examined (45).— CORRIENTES: Estancia Puesto Valle, 25 km E Ituzaingó, 1 (AMNH). FORMOSA: Bouvier, 1 (ROM). MISIONES: Cataratas del Iguazú, 1 (MPB); Colonia Mártires, 3 (MACN); Dos de Mayo, 2 (1 CEM, 1 CML); Estancia San Jorge, 3 (MACN); Gobernador Lanusse, 2 (CML); Iguazú, 18

Table 6. Measurements of Artibeus fimbriatus, Artibeus lituratus, *and* Artibeus planirostris. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Artibeus fimbriatus*	*Artibeus lituratus*	*Artibeus planirostris*
Total length	86.0 ± 5.47, 5 80.0 - 90.0	94.1 ± 17.03, 6 75.0 - 120.0	87.8 ± 8.63, 40 75.0 - 110.0
Hindfoot length	16.0, 1	16.5 ± 1.93, 6 14.0 - 18.8	16.6 ± 3.36, 40 12.0 - 25.7
Ear length	21.5 ± 2.82, 5 18.5 - 25.0	22.3 ± 1.61, 6 20.0 - 24.3	21.9 ± 3.26, 40 15.0 - 26.3
Forearm length	66.1 ± 1.14, 6 64.0 - 67.2	71.4 ± 1.66, 13 68.0 - 74.0	65.7 ± 1.89, 43 62.0 - 69.0
Weight	56.5, 1	76.6 ± 10.69, 3 70.0 - 89.0	52.3 ± 6.67, 36 39.0 - 69.0
Condylobasal length	28.4 ± 0.34, 5 27.9 - 28.7	28.1 ± 0.58, 13 27.0 - 28.9	27.2 ± 0.66, 33 26.0 - 28.8
Least interorbital breadth	8.3 ± 0.48, 5 7.8 - 8.9	7.7 ± 0.34, 8 7.1 - 8.1	8.5 ± 0.44, 12 7.8 - 9.1
Zygomatic breadth	18.9 ± 0.38, 6 18.5 - 19.6	19.1 ± 0.36, 13 18.3 - 19.7	19.1 ± 0.64, 34 17.7 - 20.4
Greatest length of skull	31.2 ± 0.51, 5 30.7 - 31.8	31.6 ± 0.61, 13 30.3 - 33.0	30.2 ± 0.68, 36 29.0 - 32.0
Postorbital constriction	7.3 ± 0.24, 6 7.1 - 7.7	6.6 ± 0.25, 13 6.4 - 7.2	7.4 ± 0.26, 36 6.9 - 7.9
Breadth of braincase	13.3 ± 0.43, 5 13.0 - 14.1	13.7 ± 0.49, 13 13.2 - 15.0	13.5 ± 0.38, 35 12.4 - 14.2
Length of maxillary toothrow	11.3 ± 0.28, 6 10.9 - 11.7	11.0 ± 0.26, 12 10.6 - 11.5	11.0 ± 0.31, 34 10.5 - 11.7
Palatal length	15.4 ± 0.20, 6 15.2 - 15.8	14.9 ± 0.57, 13 14.1 - 15.7	14.4 ± 0.44, 36 13.7 - 15.2
Mastoidal breadth	16.8 ± 0.46, 5 16.2 - 17.5	16.6 ± 0.43, 13 16.0 - 17.5	16.3 ± 0.50, 34 15.5 - 17.4
Length of mandibular toothrow	10.8 ± 0.25, 5 10.5 - 11.1	10.5 ± 0.33, 12 9.7 - 10.9	10.8 ± 1.04, 35 9.6 - 12.9
Length of mandible	21.9 ± 0.41, 6 21.4 - 22.5	21.9 ± 0.45, 13 21.0 - 22.5	21.2 ± 0.53, 36 20.2 - 22.5
C-C (width across canines)	8.9 ± 0.28, 4 8.6 - 9.3	8.9 ± 0.22, 12 8.5 - 9.3	8.9 ± 0.32, 35 8.2 - 9.6
M-M (width across molars)	14.0 ± 0.33, 5 13.6 - 14.4	13.3 ± 0.36, 12 12.6 - 13.9	12.9 ± 0.35, 33 12.2 - 13.6

(MACN); Jct. Hwy 2 and Arroyo Paraíso, 3 (1 CML, 1 IADIZA-CM, 1 OMNH); Jct. Hwy 21 and Arroyo Oveja Negra, approx. 2 km W Parque Provincial Moconá, 6 (4 CML, 2 IADIZA-CM); Paraje Paraíso, 16 km SE, 1 (CML); Parque Nacional Iguazú, 2 (MACN); San Pedro, 47 km SE, 2 (CML).

Additional Records.— CORRIENTES: Itá Ibaté (Lord et al., 1973). MISIONES: Arroyo Urugua-í (Massoia et al., 1987); Departamento Cainguás (Massoia, 1980); Departamento Candelaria (Massoia, 1980); Departamento Capital (Massoia, 1980); Departamento Guaraní (Massoia, 1980).

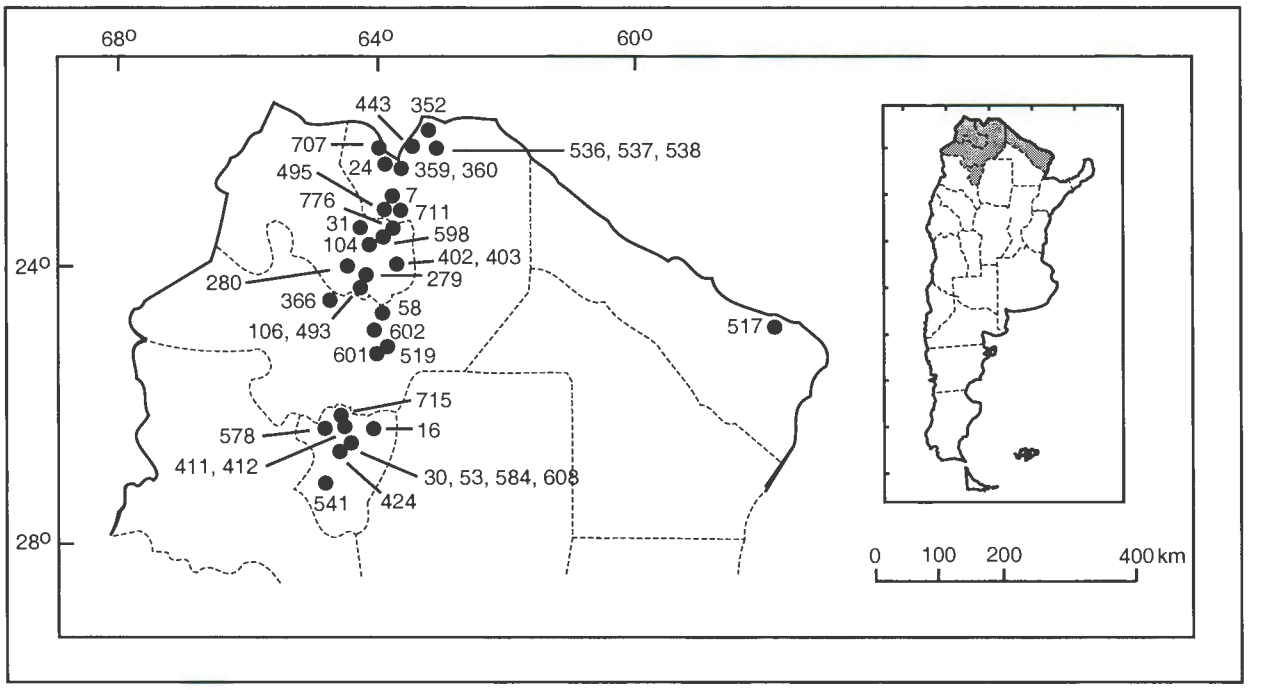


Figure 52. Map of the localities of *Artibeus planirostris*.

Artibeus planirostris (Spix)

Phyllostoma planirostre Spix, Simiarum et Vespertilionum Brasiliensium species novae ou histoire naturelle des especies nouvelles de singes et de chauve-souris observées et recueillies pendant le voyage dans l'intérieur du Bresil execute par ordre de S. M. le Roi de Baviere dans les annees 1817, 1818, 1819, 1820. Francisci Seraphici Hübschmanni, Monachii, p. 66, 1823.

Artibeus planirostris: Dobson, Catalogue of the Chiroptera in the Collection of the British Museum, British Museum (Natural History), London, p. 515, 1878.

Type Locality.— Brazil, Bahia, Salvador.

Olrog (1979) reported *A. jamaicensis hercules* in Cerro Calilegua, Jujuy Province. This subspecies was grouped with *A. planirostris* and associated with *A. fallax* (Koopman, 1978). The taxonomic situation of the *A. lituratus-jamaicensis-planirostris* species complex is complicated in northern Argentina (Handley, 1989, 1991). Until further study, we recognize specimens from the Northwest as *A. planirostris*. The following subspecies occurs in Argentina.

Artibeus planirostris fallax Peters

Artibeus fallax Peters, Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, p. 355, 1865.

Artibeus planirostris fallax: Andersen, Proceedings of the Zoological Society of London, 1908:242, 1908.

Type Locality.— Surinam, Dieperink.

Distribution.— Southern Venezuela and the Guianas to northern Argentina (Koopman, 1993).

Distribution in Argentina.— Figure 52.

Description (Figs. 53 and 54).— Size is large, but slightly smaller than *A. lituratus*. Length of the forearm ranges from 62 to 69 mm. The pelage is soft and dense. Dorsal color is grayish brown; the basal band is wide and pale, and the tips are dark; some hairs have ashy or white frosted tips. The venter is light brown and most hairs are unicolored, but frosted tips more common than on the dorsum. The facial stripes are only slightly evident or absent in many specimens. Hair is scarce over the uropatagium, legs, and toes. Wing tips have a white spot. Other characteristics are similar to *A. lituratus*.

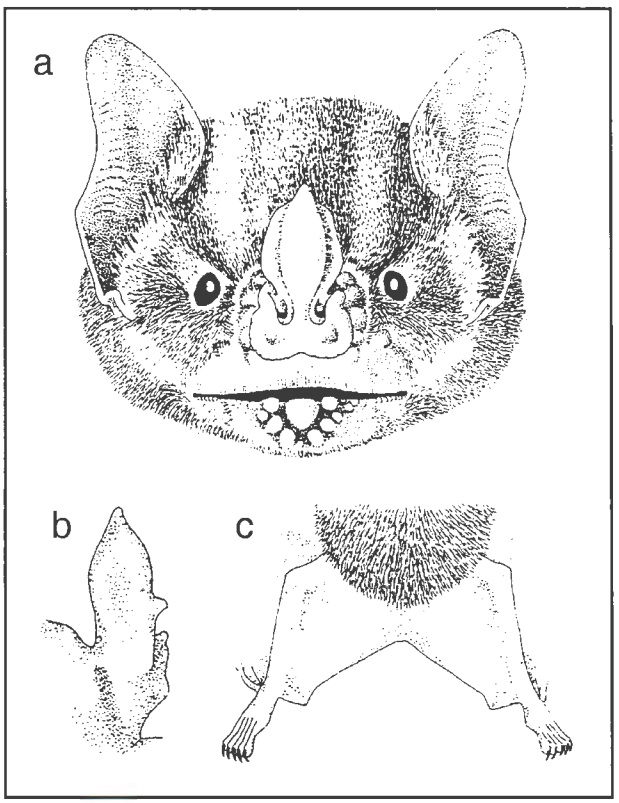


Figure 53. *Artibeus planirostris*: (a) face; (b) tragus; and (c) uropatagium.

The skull is similar to *A. lituratus* but less robust, the postorbital constriction is wide, and the postorbital processes are not as distinct.

The dental formula is 2/2, 1/1, 2/2, 2-3/3, total 30-32. Dentition is similar to that of *A. lituratus*; M3 is minute, but is usually present.

Measurements.— Table 6.

Comments.— Little is known about the biology of this species in Argentina. Our data show that it is common, but not abundant, and inhabits the forests of northwestern Argentina as far south as Tucumán Province, where it is rare. Reproductive data are scarce. Males have been captured with scrotal testes in the middle of October in Aguas Chiquitas, Tucumán Province. Specimens collected in the middle of May in Piquirenda Viejo, Salta Province, and at the end of June in Laguna La Brea, Jujuy Province, were not reproductively active. Individuals were reproductively active at the middle of November in Serranía de las Pavas, Salta Province.

Specimens Examined (135).— JUJUY: Abra de Cañas, El Monolito, 1700 m, 1 (CML); Aguas Negras, Parque Nacional Calilegua, 1 (CML); Calilegua, 1 (FCM); Camino de Cornisa, 10 km W Dique La Ciénaga, 1 (CML); Laguna La Brea, 3 (1 MD, 2 OMNH); Laguna La Brea, 25 km W Palma Sola, 9 (CML); On Highway 9 at border with Salta, at campground on the way to El Carmen, 3 (1 IADIZA-CM, 2 OMNH); Río de Zora y cruce con ruta 34, 1 (CML); Yuto, 4 (3 AMNH, 1 CML). SALTA: Abra Grande, 1 (OMNH); Aguas Blancas, 2 (CML); Arroyo Los Noques, Parque Nacional El Rey, 1 (CM); Itaú (Campo Largo), Sierras de Tartagal, 1600 m, 1 (CML); Junta de los Ríos Tarija y Bermejo, 1 (CML); Juntas de San Antonio, 13 (CM); La Caldera, 1 (ROM); Los Madrejones, Junta de los Ríos Tarija e Itaú, 1400 m, 1 (CML); Orán, 15 km S, 15 km W, along Río Santa María, 4 (CM); Paso de la Cruz, 2 (CML); Piquirenda Viejo, 30 km N Tartagal, 12 (CM); Piquirenda Viejo, 6 km W, 1 (OMNH); Piquirenda Viejo, 8 km W, 2 (CML); Río El Naranjo, 14 km W de Ruta provincial 5, 1 (CML); Río Guanaco, 32 km al NE de Lumbrera, 1 (CML); Serranía de las Pavas, 3 (1 CML, 2 OMNH); Tabacal, 41 (40 MACN, 1 TTU). TUCUMÁN: Agua Colorada, 8 (MACN); Aguas Chiquitas, Sierras de Medina, 800 m, 1 (CM); Arroyo Aguas Chiquitas, Reserva Provincial Aguas Chiquitas, 1 (CML); Las Juntas, 22 km W Choromoro, 1 (CML); Las Juntas, 22 km W Choromoro on Hwy 312, 3,500 ft., 1 (OMNH); Las Tipas, Parque Biológico, 1 (CML); Playa Larga, Río Los Sosa, Ruta 307 km 19.7, 1 (CML); Quebrada del Toro, 1 (CML); Reserva Provincial "Aguas Chiquitas" El Cadillal, 4 (CM); Río Loro, 3 (RMB); Taco Yana, 1 (CML).

Additional Records.— FORMOSA: Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.). JUJUY: Finca El Remate, 24 km SE San Salvador de Jujuy, 740 m (Villa-R. and Villa-C., 1971, as *A. lituratus*); Finca La Carolina, Los Perales, San Salvador de Jujuy, 1310 m (Villa-R. and Villa-C., 1971, as *A. lituratus*).

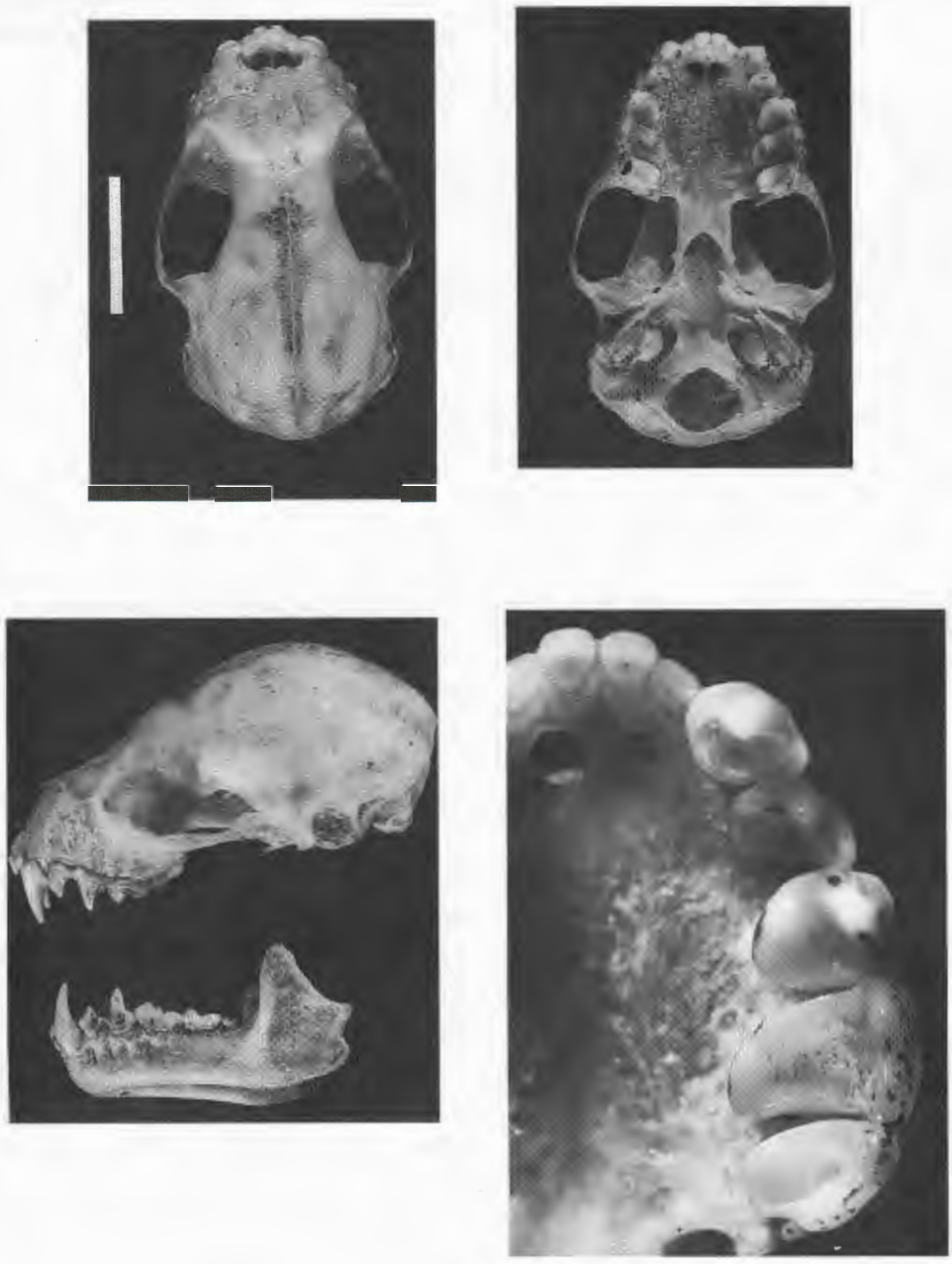


Figure 54. Skull and teeth of *Artibeus planirostris*. Adult male from Serranía de las Pavas, Salta Province (OMNH 18944). Bar = 1 cm. Teeth not to scale.

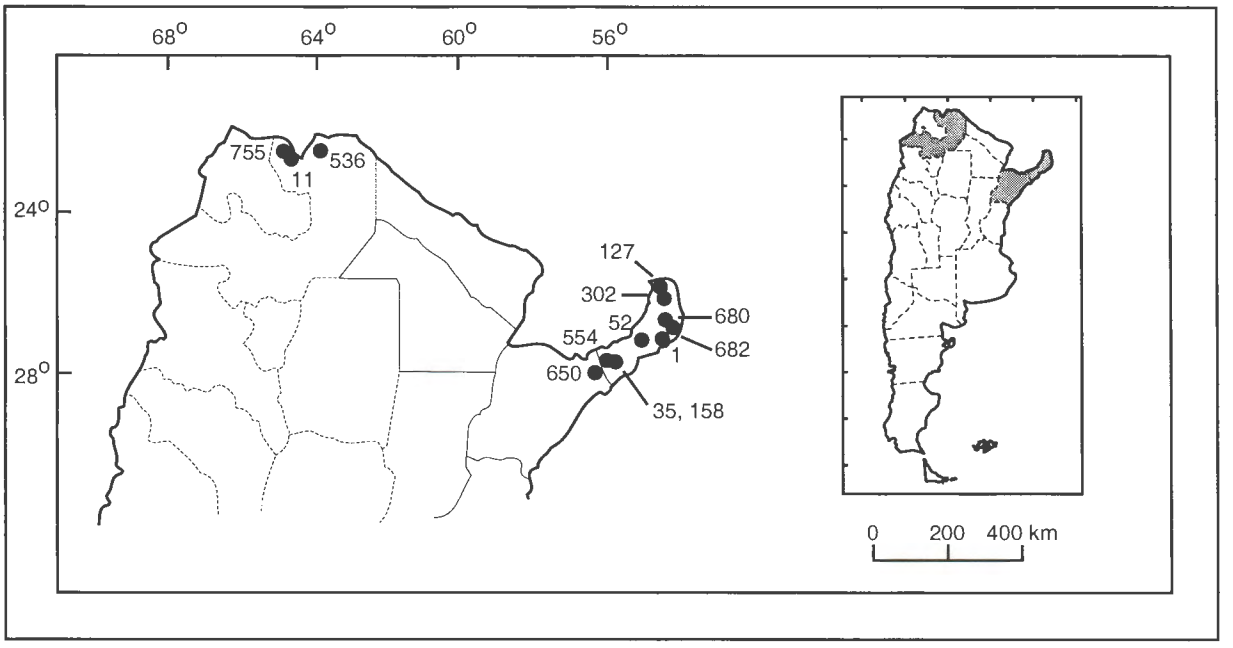


Figure 55. Map of the localities of *Pygoderma bilabiatum*.

Genus *Pygoderma*

Pygoderma bilabiatum (Wagner)

Phyllostoma bilabiatum Wagner, Wiegmann's Archiv für Naturgeschichte, Jahrgang 9, Bd. 1:366, 1843.

P [*ygoderma*] *bilabiatum*: Peters, Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, p. 357, 1866.

Type Locality.— Brazil, Sao Paulo, Ipanema.

Distribution.— This species was considered monotypic, until Owen and Webster (1983) recognized two subspecies, *P. b. bilabiatum* and *P. b. magna*, based principally on size differences. *P. b. magna* was described for northwestern Argentina and Bolivia, and *P. b. bilabiatum* was assumed to extend from northeastern Argentina northward through Brazil and Paraguay to Suriname (see also Webster and Owen, 1984).

Distribution in Argentina.— Figure 55.

Description (Figs. 56 and 57).— Size is medium; length of forearm ranges from 38.0 to 44.2 mm. The upper lip has a longitudinal fold that gives it a double-lipped appearance. A white patch on each shoulder is characteristic for this species. The borders of the ears and the tragus are yellow. General color is grayish brown, lighter and more uniform on the venter. Hairs of the dorsum are tricolored with a dark brown basal band, a paler, almost white, middle band, and brown tips slightly lighter than the basal band. Hairs of the venter are unicolored. The pelage is long and soft, uniformly distributed over the body, and extends over more than one-half of the forearm along the dorsal and ventral sides, and over the entire dorsal surface of the uropatagium and tibia (in lesser amounts on the ventral side). Membranes are dark and the small dactylopatagium is transparent.

The nose leaf is well developed, large, and wide. The uropatagium is semicircular and supported by small calcars. The medium-sized ears have rounded tips and wide bases. Numerous glands occur on the rostrum near the nose leaf and around the eyes, (particularly in males), giving a swollen appearance. Numerous papillae are found on the lower lip. A tail is absent.

The skull is distinctive, with a short rostrum (more inflated in females and in specimens from Misiones Province compared with those from Salta Province). Orbits are small; zygomatic arches are complete but thin. The palate is short and the toothrows are semicircular. The pterygoids are short and diverge posteriorly; the

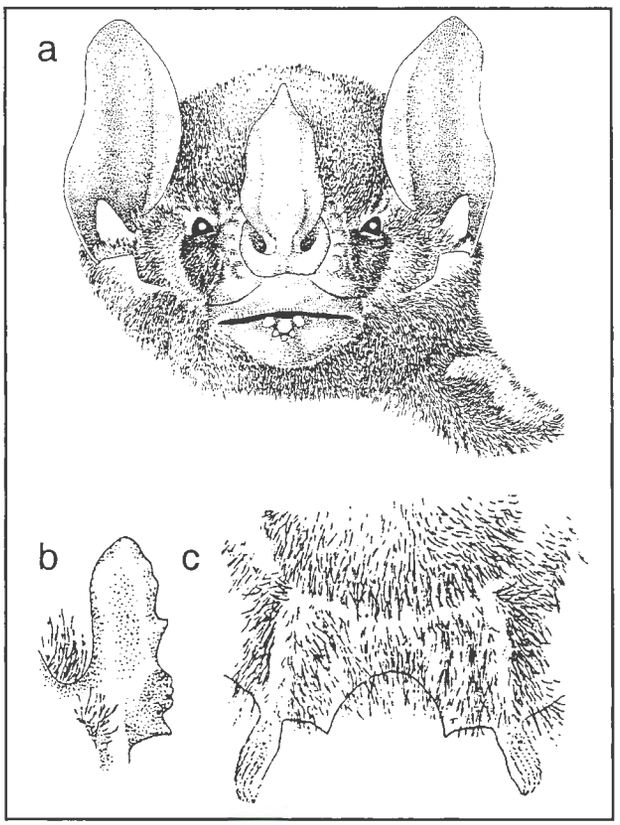


Figure 56. *Pygoderma bilabiatum*: (a) face; (b) uropatagium; and (c) tragus.

hamular process is short and blunt. The basisphenoid pits are elongate and deep.

The braincase is rounded. A low sagittal crest is present and continuous with the lambdoidal crests, which are well marked in females and less so in males.

The dental formula is 2/2, 1/1, 2/2, 2/2, total 28. The I1 is well developed, triangular and pointed, and the incisors are in contact only at their bases; their external border is sharp and serrated. The I2 is small, not reaching the cingulum of the canines, inclined inward, and with the distal border rounded and filling the space between the I1 and the canines. Canines are well developed and wide with a cutting lateral border and a very sharp tip; the cingulum is expanded inward toward the posterolingual side where it forms a small cusp. The P1 and P2 are well developed. The P1 is the widest tooth in the toothrow in lateral view, is triangular in lateral view and the cusps, except for the outer one, are little developed. The M1 is wide, with the paracone well developed and in the form of a cutting blade, and lingually with a low protocone and a less developed hypocone. The M2 is reduced and without well-differentiated cusps.

The mandibular toothrow is semicircular. Incisors are subequal in size, small, bilobed, and deeply grooved along the anterior face. Canines are normal. The internal face of the premolars has a median septum that divides it anteriorly and posteriorly. Molars with well-developed inner cusps, the second slightly less than one-half the size of the first. Occasionally a third lower or upper molar may be present on one or both sides (Owen and Webster, 1983).

Measurements.— Table 5.

Comments.— Olrog (1967) first reported this bat for Argentina. This species prefers humid forests. Fornes and Delpietro (1969) captured specimens in human dwellings near "tala" trees (*Celtis*). Specimens in Bolivia were captured in low woodlands with palms and in the densest part of the forest in swampy areas (R. M. Barquez, personal observation). This species is preyed upon by Stygian owls (*Asio stygius*) in the cerrado savanna of Brazil (Motta Junior and Taddei, 1992). Its food seems to be mainly fruit, but few data are available. Stomachs of captured specimens were empty of solids, but liquids appear to pertain to fruits. Yellowish seeds were found in the feces of one specimen from Piquirenda Viejo, Salta Province. Crespo (1982) noted that specimens of this species approached cultivated fruit trees.

Little is known about their reproduction; Crespo (1982) noted no activity in specimens captured in Misiones Province in September and November. Several females we captured in Misiones (San Pedro, 47 km E) on 31 October had near-term fetuses, one gave birth in the net. At Gobernador Lanusse, Misiones Province, 11 lactating females and a juvenile were captured in November. In Piquirenda Viejo, Salta Province, a lactating female was collected in mid-May. Specimens from Bolivia were not reproductively active in July (R. M. Barquez, personal observation). Myers (1981) captured pregnant females in March, July, and August in Paraguay. This species may reproduce all year.

Specimens Examined (37).— CORRIENTES: San Carlos, 1 (MACN). MISIONES: 6 km NE by Highway 2 of jct. Highway 2 and Arroyo Paraíso, 1 (IADIZA-

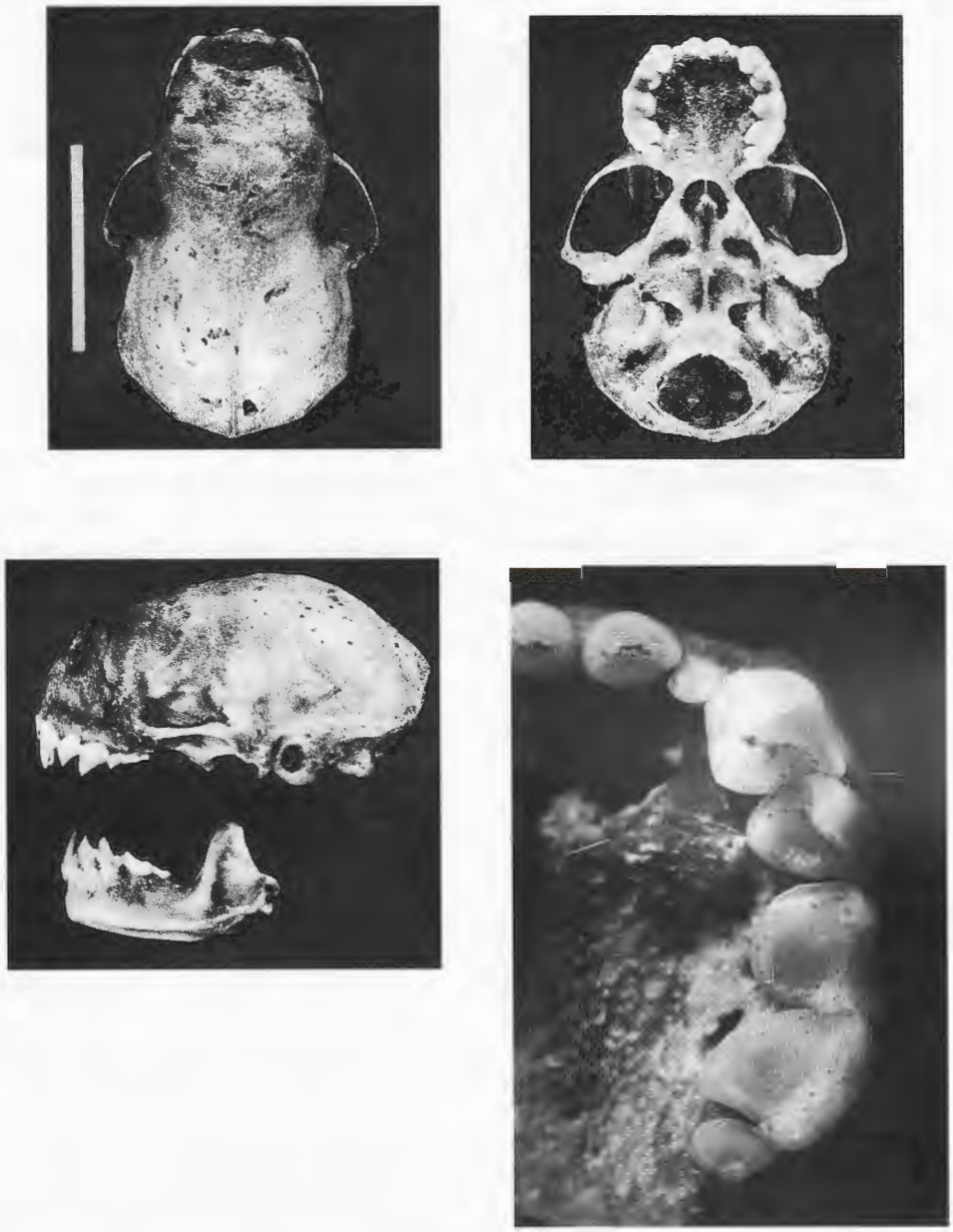


Figure 57. Skull and teeth of *Pygoderma bilabiatum*. Adult female from 47 km SE San Pedro, Misiones Province (CML 2162). Bar = 1 cm. Teeth not to scale.

CM); Almafuerte, 1 (MACN); Aristóbulo del Valle, 10 km W by road along Río Cuñapirú, 1 (CML); Colonia Mártires, 5 (MACN); Estancia San Jorge, 1 (MACN); Gobernador Lanusse, 13 (CML); Misiones (no specific locality), 1 (BMNH); Profundidad, 1 (MACN); San Pedro, 20 km al SE, 1 (RAO); San Pedro, 47 km SE, 7 (5 CML, 2 IADIZA-CM). SALTA: Agua Blanca, 2 (CML); Piquirenda Viejo, 30 km N Tartagal, 1 (CM); Vado de Arrazayal, 20 km NW Aguas Blancas, 1 (CML).

Additional Records.— MISIONES: Arroyo Urugua-í (Massoia et al., 1987); Cataratas del Iguazú (Massoia, 1980); Departamento Capital (Massoia, 1980); Departamento Guaraní (Massoia, 1980).

SUBFAMILY DESMODONTINAE

Vampires have been considered both a distinct family and a tribe (Desmodina) of the Family Phyllostomidae (Gray, 1866). Recent work (Forman et al., 1968; Jones and Carter, 1976), however, recognizes vampires as a subfamily. Three species are included, which are quite distinct from other phyllostomids. All are characterized by a reduced, almost indistinguishable, nose leaf, and the very specialized teeth needed for blood feeding, with the upper incisors and canines being sharpened blades.

KEY TO THE SPECIES

1. Thumb short, with two distinct pads; wing tips white; coronoid process more elevated than the mandibular condyle giving a triangular appearance ..... *Diaemus youngi*

1'. Thumb larger, with three large pads; wing tips not white; coronoid process more or less equal to the mandibular condyle giving a square appearance ..... *Desmodus rotundus*

Genus Desmodus

Desmodus rotundus (É. Geoffroy St.- Hilaire)

Phyllostoma rotundum É. Geoffroy St.- Hilaire, Annales du Muséum d'Histoire Naturelle, Paris, 15:181, 1810.

Desmodus rotundus: Thomas, Annals and Magazine of Natural History, ser. 7, 8:194, 1901.

Type Locality.— Paraguay. Restricted to Asunción by Cabrera (1958).

Distribution.— Widely distributed from northern Mexico southward through central and perhaps southern Argentina, with few records from the Amazon basin. Two subspecies (*D. r. murinus* and *D. r. rotundus*) are recognized, but their differences are not clear and they may not be valid taxa. Only *D. r. rotundus* is found in Argentina.

Distribution in Argentina (Fig. 58).— This species is common throughout most of its range in Argentina.

Description (Figs. 59 and 60).— Size medium, with the length of the forearm ranging from 60 to 67 mm, and the body strong and muscular. The pelage is short and stiff. Color varies, but is generally brown or gray; some specimens are reddish and others are golden. The venter is paler than the dorsum. Basal bands of the dorsal hairs are whitish, while those of the venter are dark. Dorsally, the pelage extends over the entire forearm, propatagium, uropatagium, plagiopatagium, and legs. Distribution of hair is similar dorsally and ventrally, but the forearm is not densely furred and is naked in many specimens. The nose leaf is reduced and almost imperceptible. The snout has a series of glands and a central protuberance with a V-shaped indention; the nasal openings are elliptical and elongated. The lower lip has several callosities that form a "V" with a central groove. The ears are short, separated, have a convex exterior margin, and rounded tips. The inner face of the pinna has pronounced ridges toward its external margin; the tragus has a convex internal border, a pointed tip, and a constricted base. Tail and calcar are absent. The thumb is long and has three pads, differing from *Diaemus youngi*, which has only two. The plagiopatagium attaches at the base of the foot; the uropatagium is reduced to a narrow membrane that borders the legs and the posterior end of the body.

The braincase is large and rounded; the rostrum is short; zygomatic arches are complete and widened medially. Sagittal and lambdoidal crests are poorly developed or absent. The palate is short and concave, with large incisive foramina, and its posterior margin ends at the midpoint of the zygomatic arches; the caudal spine of the palate is barely developed. Tympanic bullae are well developed (but smaller than in *D. youngi*) and cover about one-half of the cochlea.

The dental formula is I 1/2, C 1/1, P 1/2, M 1/1, total 20. The I1 and C1 are bladelike, acutely pointed, and with sharp posterior margins. The M1 is reduced and smaller than P1; both are laterally compressed and bladelike. A wide space separates i1 and i2 from the canines. The i1 and i2 are bilobed (in *D. youngi* only the outer lower incisors are bilobed). The p1, p2, and m1 are reduced, as in the upper toothrow. The coronoid

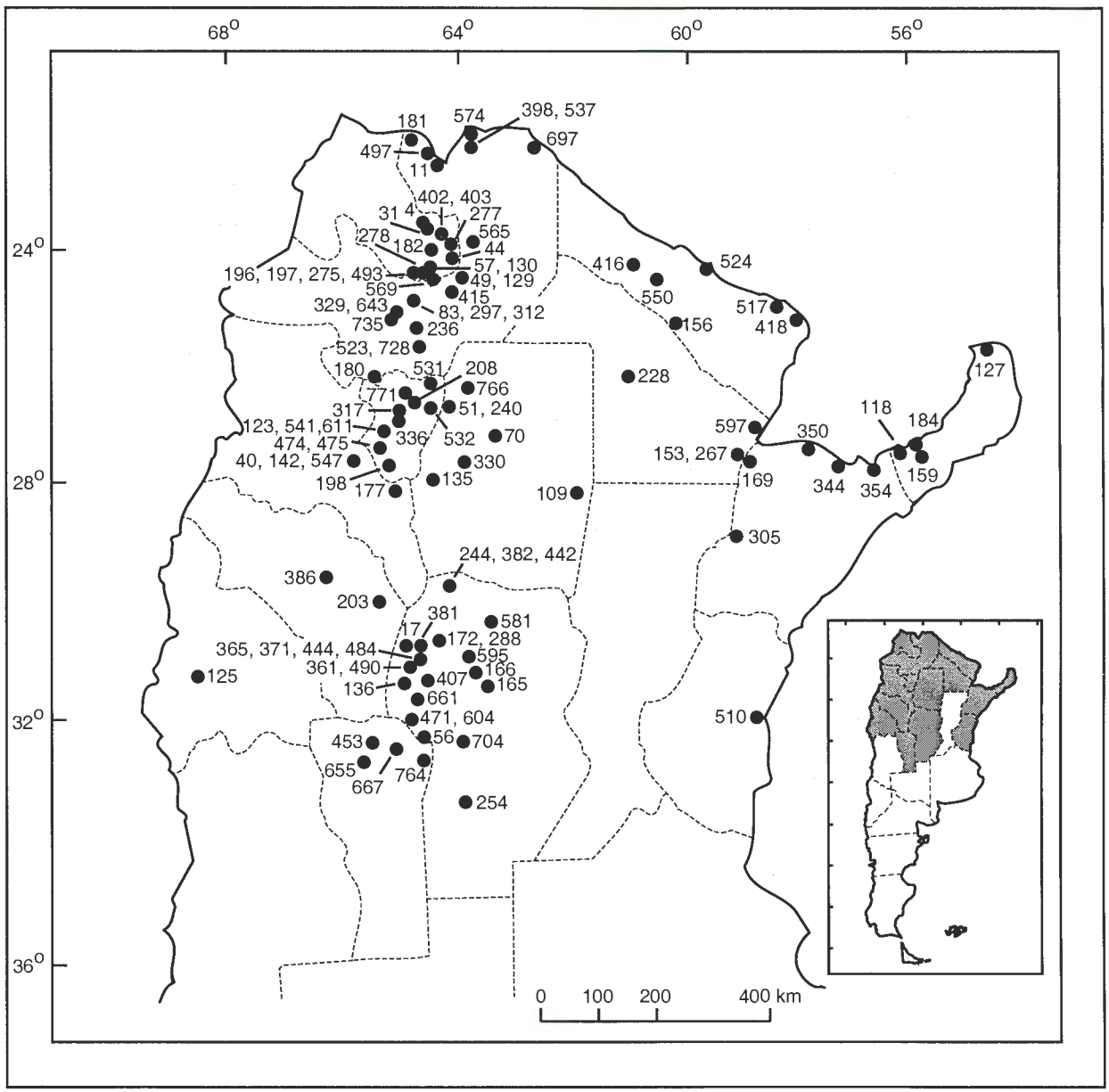


Figure 58. Map of the localities of *Desmodus rotundus*.

process and the mandibular condyle are at about the same height such that the bone connecting them runs almost parallel to the mandibular rami (in *Diaemus* the mandibular condyle is much lower than the coronoid process and the bone connecting them is at an oblique angle to the mandibular rami).

Measurements.— Table 7.

Comments.— A great deal of data is available on this species because of its economic importance and its role in the transmission of rabies. The method of feeding in this species presents risks to public health; its diet consists of blood. Trypanosomiasis and paralytic rabies, which have been detected in this species, damage cattle and may cause death to both animals and humans. These bats prefer to bite domestic animals on the shoulders, neck, hips, legs, at the base of the horns and above the hooves. Villa-R. et al. (1969) found that 73.4% of the stomachs examined contained mammal blood, 10.1% contained both mammal and bird blood, and

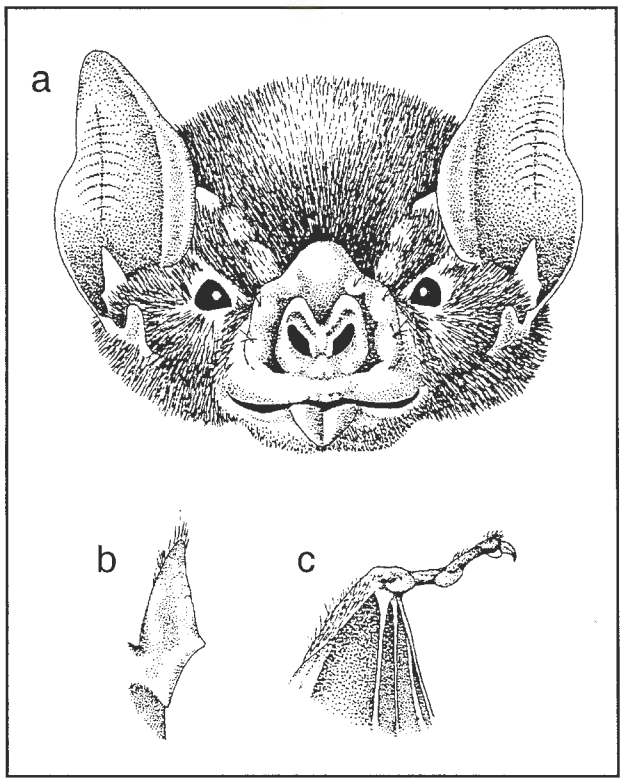


Figure 59. *Desmodus rotundus*: (a) face; (b) tragus; and (c) calluses of the thumb.

16.5% contained milk. Although domestic animals are the primary source of food, large native mammals and even humans are also used. Fruits (Arata et al., 1967) and insects (Greenhall, 1972) also have been reported in stomachs of this species.

This species is gregarious; it may form colonies of up to 5,000 individuals (Crespo et al., 1961). In the province of Santiago del Estero, individuals formed a "principal" colony and one or more "satellite" colonies (Lord et al., 1976); the principal colony consisted of a dominant male, some young males, and most of the females. Other males formed the satellite colonies. Most colonies are located in caves or abandoned buildings. Tunnels, bridges, and drainage pipes seem to be temporary refuges or are used as sites for digestion (Greenhall et al., 1983*a*). Roosts are shared with many other species of bats. We found a group of vampires inhabiting an outhouse in Chaco Province; the bats entered through the two-hole seat and took shelter in the dark tank below. The walls of the outhouse were streaked with bloody bat stool. For obvious reasons, they had made the structure unusable. Vampires are found in all types of habitats except the high mountains and their dispersal is influenced by the advance of human populations and their livestock. In the dry thornscrub of Chaco Province in northern Argentina, we found a very deep (> 40 m) well that, during daylight hours, served as a roost for about 40 vampires. Further south in Argentina, MAM and RMB spoke with a wildlife official in Puerto Madryn, Chubut Province, who reported observations of a vampire feeding at the base of the rear flipper of a sea lion (*Arctocephalus australis*) that was hauled out on the beach. This would constitute the southernmost record for the vampire and, although we have not verified the species in that area, the observation was so unusual (yet typical of vampires) that we mention it here; we do not, however, include Puerto Madryn as a locality for this species.

Schmidt (1972) has reported acoustical recognition between mothers and young. Fidelity to roosts is known (Kunz, 1982); Schmidt et al. (1971) recorded the return of a female after a five-month absence from an area. Wilson (1973) described the reproductive cycle of this species as non-temporal polyestry; reproduction occurs throughout the year, probably due to the continuous availability of food.

After a gestation of about seven months, a single young is born and the placenta is eaten by the mother (Schmidt, 1974). Flight begins at 60 days of life, when the young feed on blood regurgitated by the mother. At four months of age these bats can feed themselves, but accompany their mothers during feeding flights. Aspects of the biology of this species are summarized in Greenhall et al. (1983*a*) and Linhart (1970).

Specimens Examined (144).— CATAMARCA: Andalgalá, 1 (MACN); Choya, 13 km NNW of Andalgalá, 4,000 ft., 4 (1 CML, 1 IADIZA-CM, 2 OMNH); Potrero River Dike, Potrero, Approx. 13 km N Andalgalá, 1 (MSB). CHACO: El Mangrullo, 20 km NNW by road and 11 km NE by road, 2 (CML); Estancia San Miguel, along Hwy 90, 15 km NW jct. Hwy 90 and Hwy 11, 8 (5 CML, 3 IADIZA-CM); Río de Oro, General Vedia, 1 (FCM). CÓRDOBA: Los Hoyos, 20 (MACN); Los Molles, 13 (MACN). CORRIENTES: Estancia La Palmita, 1 (OMNH); Goya, 5 (BMNH); Ituzaingó, 25 km E, 1 (AMNH). FORMOSA: Colonia km 503, 1 (MACN); Las Lomitas, 4 (MACN); Las Mercedes, 1 (MACN); Patiño, 1 (MACN); Pozo del Tigre, 1 (MACN). JUJUY: Abra de Cañas, 1730 m, 1

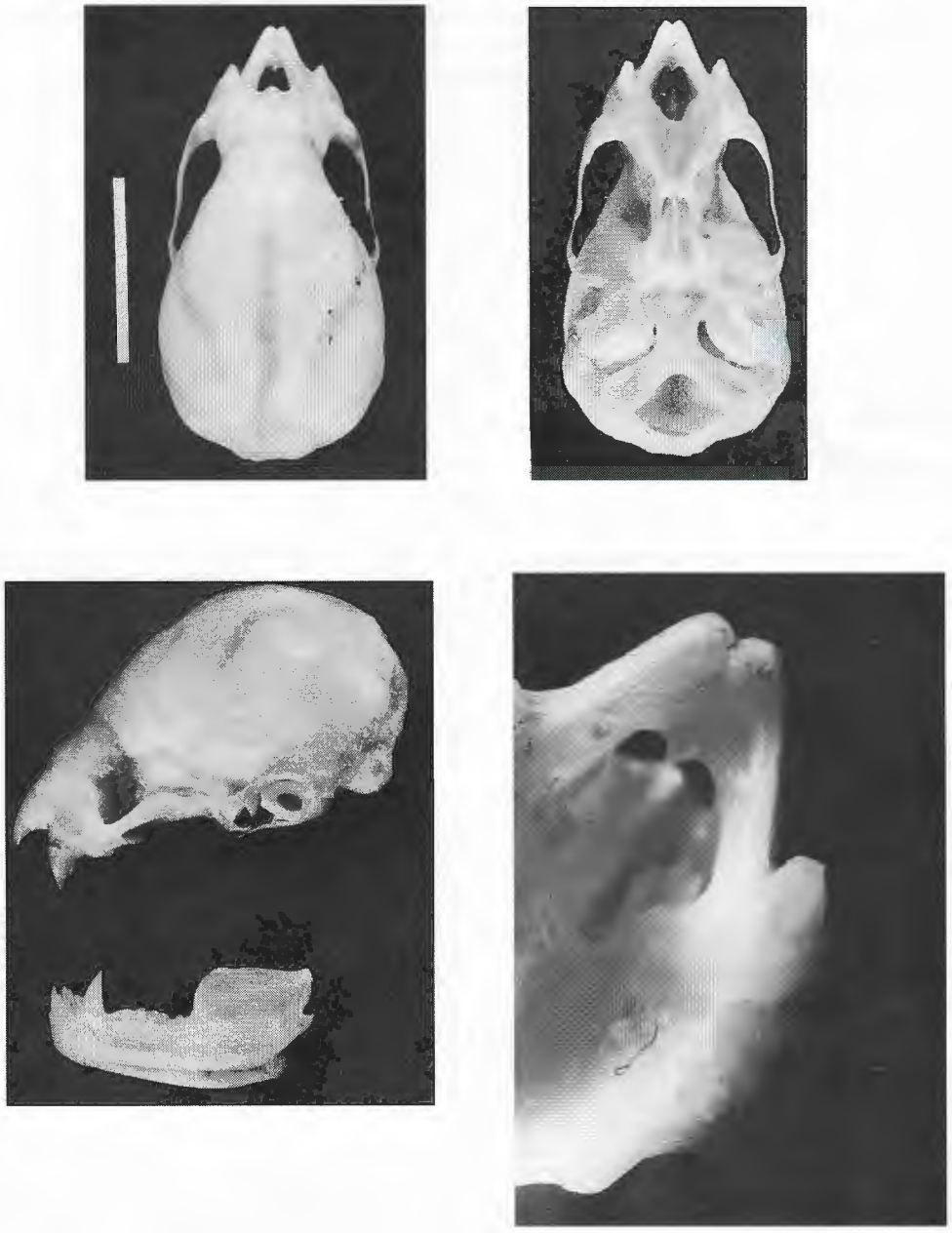


Figure 60. Skull and teeth of *Desmodus rotundus*. Adult male from Laguna La Brea, Jujuy Province (OMNH 18662). Bar = 1 cm. Teeth not to scale.

(CML); Aguas Negras, Parque Nacional Calilegua, 2 (CML); Dique Las Maderas, 1 (MACN); Finca El Pongo, 45 km E San Salvador de Jujuy, 1 (TCWC); Laguna La Brea, 2 (PIDBA); Laguna La Brea, 25 km W Palma Sola, 2 (OMNH); On Highway 9 at border with Salta, at campground on the way to El Carmen, 2 (1 IADIZA-CM, 1 OMNH). LA RIOJA: El Barreal, 1 (CML); La Rioja, 1 (MACN). SALTA: Abra de La Punilla, 1 (MACN); Agua Blanca, 1 (CML); Betania, 1 (ROM); El Porvenir, 1 (ROM); Güemes, 6 (MACN); Humaita, 1 (MACN); Laguna de las Catas, 1 (CML); Las Lajitas, 3 (MACN); Orán, 20 km al NW de Agua

Table 7. Measurements of Desmodus rotundus *and* Diaemus youngi. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Desmodus rotundus*	*Diaemus youngi*
Total length	84.6 ± 6.33, 14 78.0 - 95.0	86.0, 1
Hindfoot length	17.0 ± 1.57, 17 14.2 - 21.0	17.5, 1
Ear length	19.1 ± 2.11, 11 15.0 - 22.0	18.8, 1
Forearm length	62.8 ± 2.21, 18 60.0 - 66.5	50.7, 1
Weight	40.0 ± 4.80, 6 35.0 - 47.5	40.0, 1
Condylobasal length	21.8 ± 0.74, 17 20.7 - 23.9	20.3, 1
Least interorbital breadth	6.5 ± 0.22, 19 6.0 - 6.9	6.5, 1
Zygomatic breadth	12.3 ± 0.29, 17 11.9 - 13.1	14.1, 1
Greatest length of skull	24.4 ± 0.57, 17 23.6 - 26.0	24.0, 1
Postorbital constriction	5.5 ± 0.20, 19 5.2 - 6.0	6.4, 1
Breadth of braincase	12.6 ± 0.44, 18 12.2 - 13.8	12.9, 1
Length of maxillary toothrow		3.2, 1
Palatal length	9.1 ± 0.43, 16 8.0 - 10.0	7.9, 1
Mastoidal breadth	12.9 ± 0.32, 18 12.5 - 13.9	12.9, 1
Length of mandibular toothrow	4.8 ± 0.16, 14 4.5 - 5.0	3.9, 1
Length of mandible	15.4 ± 0.45, 19 14.7 - 16.7	15.1, 1
C-C (width across canines)	6.3 ± 0.29, 19 5.7 - 7.0	6.1, 1
M-M (width across molars)	6.3 ± 0.31, 18 5.9 - 7.0	6.2, 1

Blanca, 1 (MACN); Piquirenda Viejo, 6 km W, 2 (1 CML, 1 OMNH); Quebrada de Acambuco, 5 km W Dique Itiyuro, 1 (IADIZA-CM); San Agustín, 3 (MACN); Santa Victoria Este, 13 (MACN). SAN JUAN: Castaño Nuevo, 9 km NW Villa Nueva, 1 (OMNH). SAN LUIS: San Francisco del Monte de Oro, 7 km E from downtown, 2 (OMNH). SANTIAGO DEL ESTERO: Arenales, 15 km E Piedrabuena, 4 (TTU); Bañado de Figueroa, Río Salado, 1 (CML); El Rincón, 2 (MACN); Huyamampa, 3 (CML); La Libertad, 1 (MACN); Villa Mercedes, 2 (MACN); TUCUMÁN: Casa de Piedra, Río Los Sosa, ruta 307, km 24.9, 850 m, 1 (CML); Dique San Ignacio, 1 (CML); El Cadillal, 1 (CML); Horco Molle, 15 km W San Miguel de Tucumán, 1 (CM); Monte Bello, 3 (CML); Monte Bello, margen derecha del Río Medina, 1 (CML); Piedra Tendida, 5 km W de Dique El Cajón, 1 (CML); Piedrabuena, 1 (TTU); Playa Larga, Río Los Sosa, Ruta 307 km 19.7, 1 (CML); Río Los Sosa, Ruta 307, km 23.9, camino a Tafí del Valle, 850 m, 1 (OMNH); Vipos, Estancia San Pedro, 3 (CML).

Additional Records.— CATAMARCA: Cuesta del Totoral (S. Lougheed, personal communication).

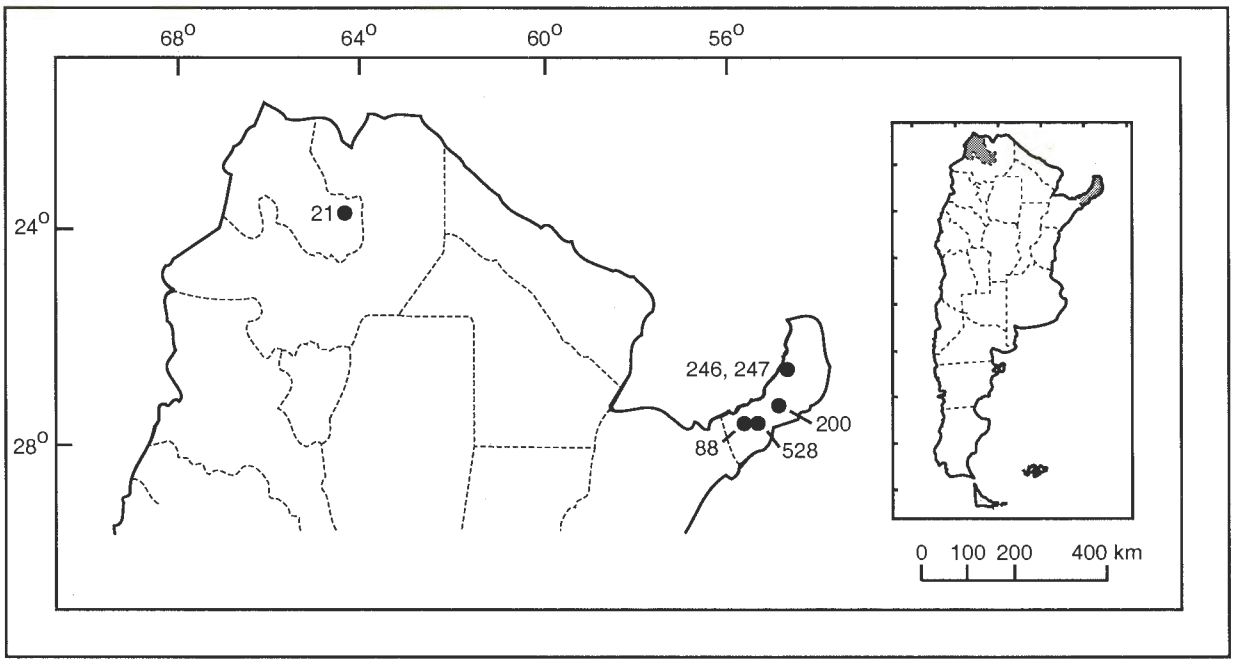


Figure 61. Map of the localities of *Diaemus youngi*.

CHACO: Colonia Benítez, 20 km N Resistencia, 30 m (Villa-R. and Villa-C., 1971). CÓRDOBA: Agua de Ramón (Villa-R. and Villa-C., 1971); Arroyo La Higuera (Villa-R. and Villa-C., 1971); Chacra La Merced (Villa-R. and Villa-C., 1971); Chancaní (Tiranti and Torres, 1998); Corazón de María (Villa-R. and Villa-C., 1971); Córdoba (Villa-R. and Villa-C., 1971); Cruz del Eje (Villa-R. and Villa-C., 1971); El Tuscal (Villa-R. and Villa-C., 1971); Espinillo (Tiranti and Torres, 1998); Finca Tabaquillo, 15 km E Cruz del Eje (Villa-R. and Villa-C., 1971); La Argentina (Villa-R. and Villa-C., 1971); La Bismutina (Villa-R. and Villa-C., 1971); La Higuera (Villa-R. and Villa-C., 1971); La Población (Villa-R. and Villa-C., 1971); La Pochita, Baritina (Villa-R. and Villa-C., 1971); Las Chacras (Villa-R. and Villa-C., 1971); Mina San Ignacio (Villa-R. and Villa-C., 1971); Niño Dios, más o menos 1900 m (Villa-R. and Villa-C., 1971); Ojo de Agua (Villa-R. and Villa-C., 1971); Palo Seco (Villa-R. and Villa-C., 1971); Rayo Cortado-Cerro Colorado (Villa-R. and Villa-C., 1971); Río Ceballos (Villa-R. and Villa-C., 1971); Río Hondo, Departamento Cruz del Eje (Villa-R. and Villa-C., 1971); Río Hondo, Departamento San Alberto (Villa-R. and Villa-C., 1971); San Isidro (Villa-R. and Villa-C., 1971); San Juan (Villa-R. and Villa-C., 1971); Segunda Usina (Tiranti and Torres, 1998). CORRIENTES: Corrientes (Fornes and Massoia, 1967); Isla Apipé Grande (SENASA=Anonimo, 1970); Itá Ibaté (Lord et al., 1973). ENTRE RÍOS: Parque Nacional El Palmar (R. M. Barquez, personal observation). FORMOSA: Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.). JUJUY: Angosto El Duraznal, 15 km S Palma Sola, 1225 m (Villa-R. and Villa-C., 1971); Arroyo La Urbana, 45 km E y 5.4 km SE San Salvador de Jujuy, 620 m (Villa-R. and Villa-C., 1971); Cercanías de San Pedro (Villa-R. and Villa-C., 1971); Cueva del Tigre, 74 km N Pampa Blanca, 700 m (Villa-R. and Villa-C., 1971); Dique Las Maderas, 42 km San Salvador de Jujuy, 920 m (Villa-R. and Villa-C., 1971); Finca Catamontaña, 33 km SSE San Salvador de Jujuy, 925 m (Villa-R. and Villa-C., 1971); Finca El Olvido, 15 km E Palma Sola (Villa-R. and Villa-C., 1971); Puesto Viejo, 16 km N Güemes, Río Las Pavas (Villa-R. and Villa-C., 1971). MISIONES: Arroyo Urugua-í (Massoia et al., 1987); Candelaria (Massoia, 1980); Cataratas del Iguazú (Crespo, 1982); Colonia Mártires, Chacra Ferreira, 125 m (Villa-R. and Villa-C., 1971); Cueva María Antonia (Fornes et al., 1969); Departamento Capital (Massoia, 1980). SALTA: Apolinario Saravia, 5 km W (Villa-R. and Villa-C., 1971); Cebilar, 20 km W Apolinario Saravia (Villa-R. and Villa-C., 1971); Cueva del Indio, 4 km W Cafayate, 1800 m (Villa-R. and Villa-C., 1971); Cueva del Murcielagallo, 15 km SSW Santa Victoria,

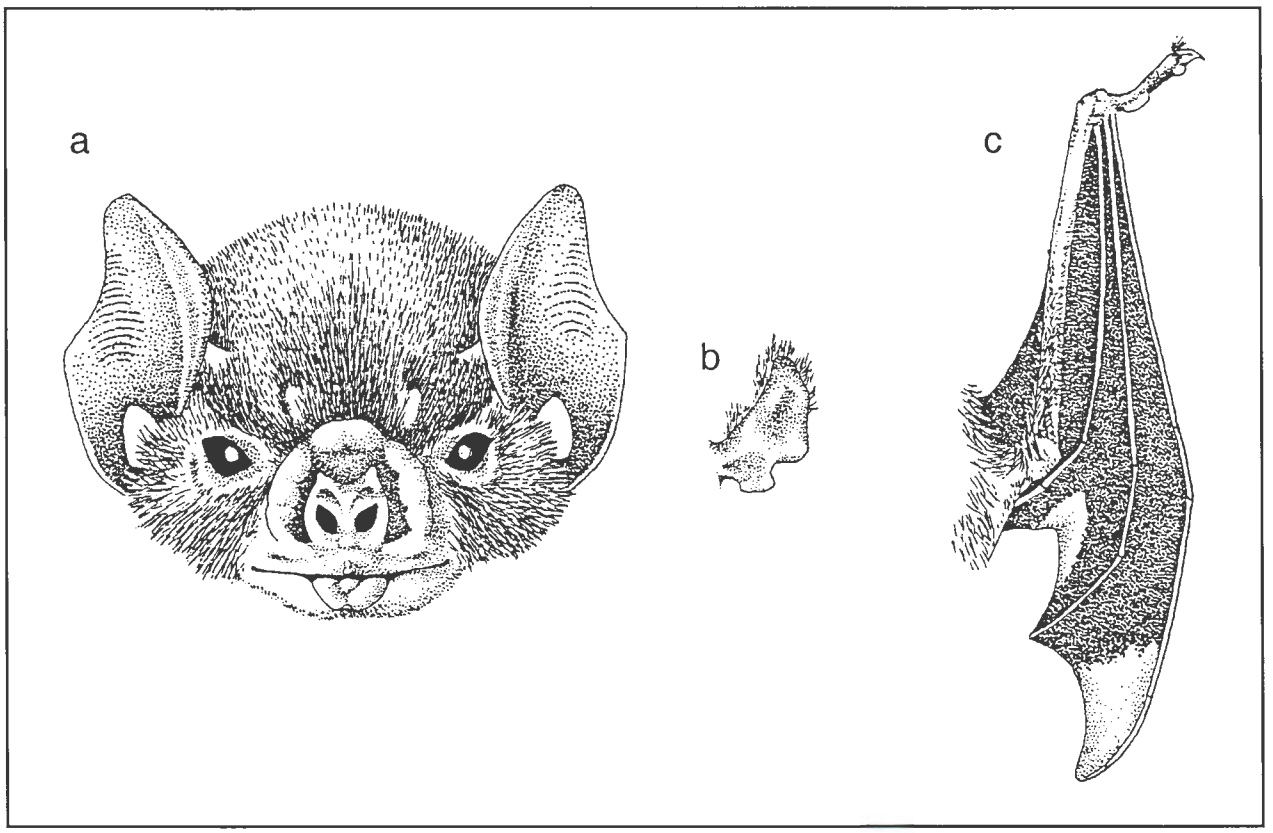


Figure 62. *Diaemus youngi*: (a) face; (b) tragus; and (c) wing.

2000 m (Villa-R. and Villa-C., 1971); General M. M. de Güemes, 30 km SSW (Villa-R. and Villa-C., 1971); Paso Quintana, Rosario de la Frontera (Romaña and Abalos, 1950); Puesto Arroyo Cabeza de Vaca, 30 km N Apolinario Saravia (Villa-R. and Villa-C., 1971); Termas de Rosario de la Frontera (Romaña and Abalos, 1950); Toma de Los Laureles, 6 km SSW Chicoana, 1400 m (Villa-R. and Villa-C., 1971). SAN LUIS: Luján, Quines (Villa-R. and Villa-C., 1971); San Martín (Villa-R. and Villa-C., 1971); Villa Larca (Villa-R. and Villa-C., 1971). SANTIAGO DEL ESTERO: Campo Alegre (Romaña and Abalos, 1950); Chañar Pozo (Lord et al., 1976). TUCUMÁN: Ingenio Lules (Romaña and Abalos, 1950).

Genus *Diaemus*

Diaemus youngi (Jentink)

Desmodus youngi Jentink, Notes of the Leiden Museum, 15:282, 1893.

Diaemus youngi: Miller, Proceedings of the Biological Society of Washington, 19:84, 1906.

This species has been assigned to either *Diaemus* or *Desmodus* by different authors (Handley, 1976; Honacki et al., 1982; Koopman, 1978, 1982; Simpson, 1945). Hall (1981) and Koopman (1993) reiterate its status as a distinct genus.

Type Locality.— In the original description, Jentink did not provide a specific type locality, but mentioned that the material was sent to him by Dr. C. G. Young, from Berbice, New Amsterdam, British Guiana. Later, Young offered a list of localities of material sent to Jentink indicating for this species: Upper Canje Creek, Berbice, British Guiana, which is presently accepted as the type locality (Husson, 1962).

Distribution.— This species is widely distributed from central Mexico to northern Argentina; has not been reported from Chile, Uruguay, Paraguay, southern Bo-

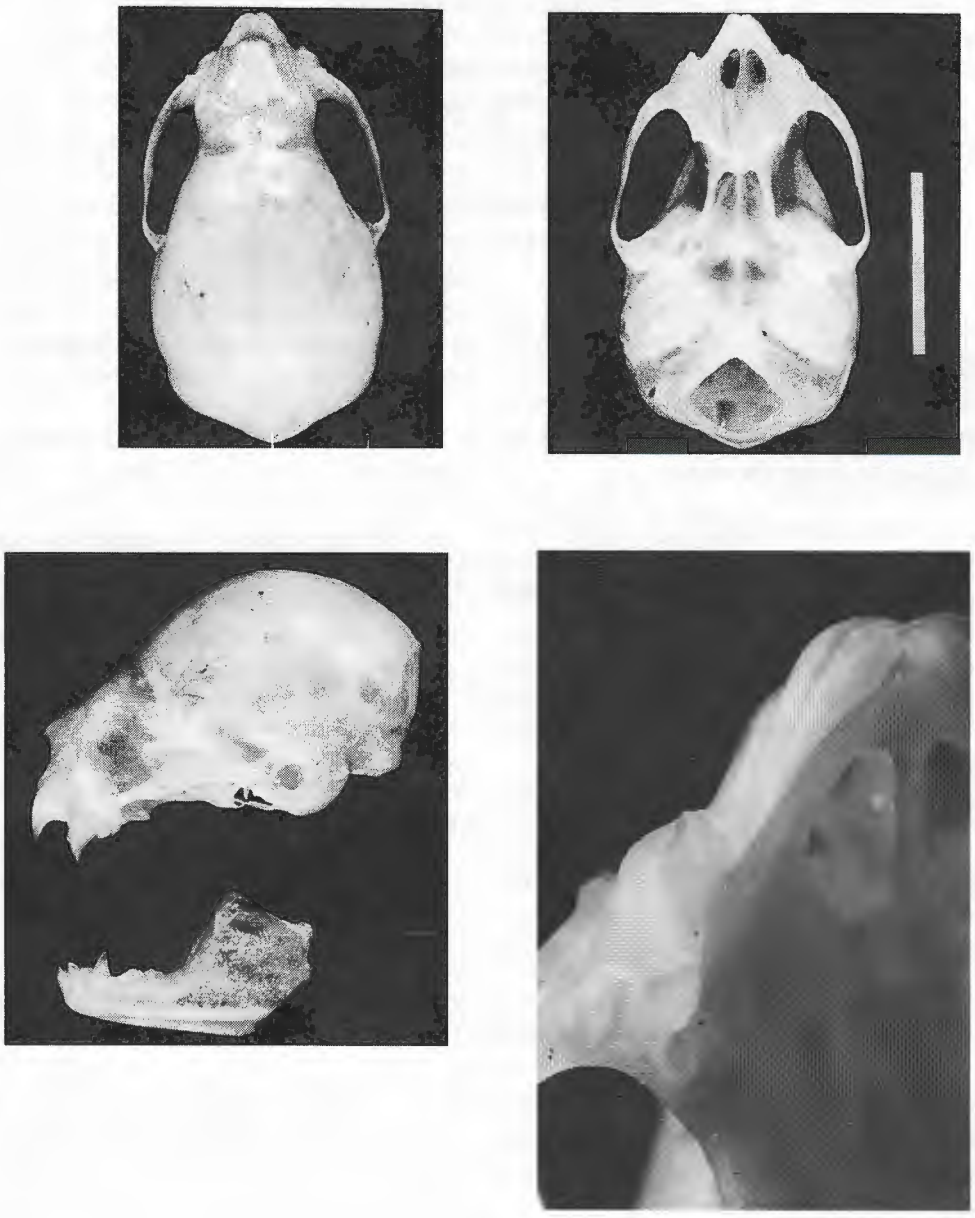


Figure 63. Skull and teeth of *Diaemus youngi*. Adult female from Agua Salada, Jujuy Province (CML 1343). Bar = 1 cm. Teeth not to scale.

livia, or from areas west of the Andes in Peru, Ecuador, and southern Colombia.

Distribution in Argentina.— Figure 61.

Description (Figs. 62 and 63).— *Diaemus youngi* is generally similar to *D. rotundus*, but is slightly smaller, with more distinctive white wing tips, and a shorter thumb having only two callosities. The specimen from Jujuy Province is golden blond both dorsally and ventrally; wing membranes are dark, almost black, making the white wing tips even more distinctive; the uropatagium is paler and covered dorsally and ventrally with blond hairs, with a fringe at the margin. The nose leaf is reduced, as in *D. rotundus*, but the "V" is more

open. Nasal openings are rounded, instead of elongated as in *Desmodus*. The posterior fleshy process of the nose leaf is almost absent and the glands bordering the nasal process are well developed, as is the furrow between these and the exterior margin of the process. Ears are similar to *Desmodus*; the tragus is less pointed. This species is characterized by large glands inside the mouth that are clearly visible in live animals when they open the mouth.

The skull is similar to *Desmodus*, but with large tympanic bullae, a more elevated rostrum, and a different mandibular configuration in which the margin between the coronoid process and the mandibular condyle is elevated, giving it a triangular aspect.

The dental formula is I 1/2, C 1/1, P 1/2, M 1-2/1, total 20-22. The i1 and i2 generally are not bilobed, although i2 is bilobed in some individuals. In the specimen from Jujuy Province, incisors are not bilobed and the total number of teeth is 20. In a specimen from Misiones Province, the outer incisors are bilobed and there are 22 teeth, but this appears to be a juvenile; possibly the small second molars are lost with age.

Measurements.— Table 7.

Comments.— Goodwin and Greenhall (1961) found this species living in groups of more than 30 individuals in a hollow tree and one individual was isolated in a well-lighted cave. Fernandez (1981) indicated that the species is scarce in Venezuela; a few individuals were observed feeding on domestic chickens, making incisions on their feet, which may kill the bird through blood loss. The Jujuy specimen (Barquez, 1984*b*) was trapped in a mist net about 4 m above the ground. About 60 cm below the bat, a small owl (*Otus choliba*) was also trapped in the net and, upon examination, was found to have spots of blood probably produced by bites from the vampire. This bat is also eaten by barn owls (*Tyto alba*) in Argentina (Massoia et al., 1989*c*).

In spite of intensive efforts to capture and collect specimens, we have only been able to capture a single animal; this species is rare in northern Argentina. The environment where it was captured was a complex mix of chacoan thorn scrub intermixed with transitional forest, and located only a few kilometers from the Yungas forest. The specimen, captured at the beginning of August, was a female with an open vagina.

Specimens Examined (3).— JUJUY: Agua Salada, app. 15 km SE Agua Caliente, lado oriental del Río San Francisco, 1 (CML). MISIONES: Eldorado, 1 (MACN); Picada Vieja, 1 (CML).

Additional Records.— MISIONES: Bonpland (Massoia et al., 1989*c*); Dos de Mayo (Massoia, 1980); Eldorado, 3 km SE (Delpietro et al., 1973).

FAMILY VESPERTILIONIDAE

This family has a worldwide distribution, being absent only from the Arctic and Antarctic. It is composed of 6 subfamilies, 34 genera, and about 315 species. Many genera are shared among various geographic regions, but some, such as *Tomopeas* in Peru, are quite restricted. Some species attain the southernmost distributions known for bats, reaching Tierra del Fuego, Argentina, and Isla Navarino, Chile. Only the Subfamily Vespertilioninae, with 5 genera and 20 species, is found in Argentina. The species in this subfamily can be identified by a long tail that is included totally in the uropatagium and reaches the posterior border of the membrane, a wide emargination at the anterior border of the palate that separates the upper incisors, and by the lack of a nose leaf (a character shared with the Noctilionidae and Molossidae). The tragus is well developed. In Argentina, the ears, which are of various shapes and sizes, provide characters diagnostic of the different genera. The ears are long, wide, and rounded in *Histiotus*; medium sized, narrow, and generally pointed in *Myotis* and *Eptesicus*; and short (almost flattened against the head) and rounded in *Lasiurus* and *Dasypterus*.

All Argentine species are insectivorous. Although various roosts are utilized, there is a tendency to occupy urban and suburban areas, dwellings, bridges, fissures in buildings and rocks, tree holes, and caves. Some species are migratory, others hibernate. The ecology and behavior of vespertilionids in Argentina is essentially unknown.

KEY TO THE SPECIES

1. Dorsal surface of uropatagium densely furred; ears short and rounded 2
1'. Dorsal surface of uropatagium nearly naked or sparsely haired; ears relatively larger and of different shapes 5

2 (1). Proximal one-half of dorsal surface of uropatagium covered with hairs; general coloration yellowish gray or yellowish brown, with olive tones ..... *Dasypterus ega*
2'. Dorsal surface of uropatagium almost completely covered with hairs 3

3 (2'). General coloration with frosted appearance, with mix of grayish or reddish hairs 4
3'. General coloration strongly reddish (brick red), but not frosted ..... *Lasiurus varius*

4 (3). Length of forearm > 50 mm ..... *Lasiurus cinereus*
4'. Length of forearm 37-42 mm ..... *Lasiurus blossevillii*
5 (1'). Ears large, generally > 25 mm, extending well beyond tip of nose when laid forward 6
5'. Ears of medium size, < 20 mm, generally not extending beyond tip of nose when laid forward 10

6 (5). Ears triangular, united by a band across the forehead; coloration dark brown; tips of dorsal hairs contrasting little with bases; only known from Misiones Province ..... *Histiotus velatus*
6'. Ears ovoid; connecting band between ears wide, narrow, or absent; general coloration paler than above, but color of tips of dorsal hairs clearly contrasting with bases 7

7 (6'). Ratio of lengths of head and body versus ear ranging from 2.3 to 3.1; length of the bullae greater than 4 mm 8
7'. Ratio of lengths of head-body versus ear ranging from 1.4 to 2.1; length of the bullae less than 4 mm ..... *Histiotus macrotus* 9

8 (7). Length of ear < 22 mm, not connected by a band; general coloration dark dorsally and ventrally ..... *Histiotus magellanicus*
8'. Length of ear > 22 mm, sometimes connected by a low band across the forehead; coloration variable, but venter grayish or whitish, paler than dorsum ..... *Histiotus montanus*

9 (7'). Tips of hairs of venter grayish or whitish; ears dark, almost black; connecting band between ears narrow or barely visible; rostrum wide; breadth across the third upper molars > 7 mm ..... *Histiotus macrotus macrotus*
9'. Tips of hairs of venter yellowish; ears relatively pale; connecting band between ears clearly visible; rostrum narrow; breadth across the third upper molars < 7 mm ..... *Histiotus macrotus laephotis*

10 (5'). Dorsal surface of base of uropatagium haired; tip of tragus pointed; I2 about same size as I1; P1 and P2 small; a "space" made up of two greatly reduced premolars is present between P3 and the canine 11

10'. Dorsal surface of base of uropatagium naked or nearly so; tip of tragus rounded; I2 larger than the inner; no "space" present between the premolar and the canine 20

11 (10). Sagittal crest present 12
11'. Sagittal crest absent 15

12 (11). P2 displaced to the lingual side of the toothrow 13
12'. P2 not displaced from toothrow 14

13 (12). Fur short and velvetlike; dorsal coloration usually bright orange, reddish, or yellowish; length of forearm 36.5-41.0 mm; postorbital constriction 4.0-4.1 mm ..... *Myotis simus*
13'. Fur short, but longer than above, and woolly; dorsal coloration cinnamon brown, some hairs with yellowish tips; length of forearm 34-36 mm; postorbital constriction 3.4-3.5 mm ..... *Myotis riparius*

14 (12'). General coloration bright red with some ochraceous tones; length of forearm 37-40 mm; greatest length of skull more than 14.5 mm; restricted to northeastern Misiones Province ..... *Myotis ruber*
14'. Coloration darker, not red or ochraceous; length of forearm > 40 mm; greatest length of the skull < 14.3 mm; known only from the provinces of Salta and Tucumán ..... *Myotis keaysi*

15 (11'). Uropatagium with lightly pigmented border and a fringe of hairs on margin, varying in degree of development 16
15'. Uropatagium without lightly pigmented border or fringe of hairs on margin 17

16 (15). Venter, especially the perianal region, pale to almost white; dorsum with mix of hairs giving a golden or silvery frosted appearance; postorbital constriction ≥ 4.0 mm; feet large and rounded; rostrum short relative to braincase; lower toothrow 5.0-5.6 mm ..... *Myotis albescens*
16'. Coloration of venter pale but not whitish; dorsum may be frosted but not as frequently as above; postorbital constriction < 4.0 mm (with rare exceptions); feet small or large but not rounded; rostrum elongated; lower toothrow 5.5-6.1 mm ..... *Myotis levis* 19

17 (15'). Dorsal hairs tricolored with white bases 1.0 mm long; length of forearm 37.7-41.2 mm; known only from the provinces of Chubut and Río Negro ..... *Myotis aelleni*
17'. Dorsal hairs uni- or bicolored 18

18 (17'). Length of forearm 37.0-41.0 mm; dorsal hairs usually bicolored with tips paler than bases; known only from the provinces of Chubut, Neuquén, and Río Negro ..... *Myotis chiloensis*
18'. Length of forearm 32.0-36.0 mm; dorsal hairs usually unicolored or moderately bicolored; widely distributed in northern Argentina ..... *Myotis nigricans*

19 (16'). Tips of dorsal hairs yellowish; uropatagium with a light border; length of forearm 35.0-38.0 mm; postorbital constriction 3.3-3.8 mm; from northwestern Argentina south to southwest of Buenos Aires Province ..... *Myotis levis dinellii*

19'. Tips of dorsal hairs pale, but not as yellowish as above; uropatagium with light border and a fringe of hairs; length of forearm 35.0-39.3 mm; postorbital constriction 3.6 to 4.0 mm; only known from the provinces of Buenos Aires and Entre Ríos ..... *Myotis levis levis*

20 (10'). Size small; length of forearm < 35 mm; length of mandible < 10.1 mm; some individuals with frosted appearance, particularly those from northeastern Argentina ..... *Eptesicus diminutus*

20'. Size large; length of forearm > 35 mm; length of mandible > 10.1 mm 21

21 (20'). Length of forearm > 41 mm (near 45 mm); greatest length of skull > 16.7 mm; zygomatic breadth > 12 mm; length of mandible > 12.9 mm ..... *Eptesicus brasiliensis*

21'. Length of forearm < 41 mm; greatest length of skull < 16.5 mm; length of upper toothrow < 6.8 mm; mandible < 13.0 mm ..... *Eptesicus furinalis*

Genus *Myotis*

This is the largest and most complex genus of bats in the Neotropics. Revisions are those of Miller and Allen (1928) and La Val (1973). The latter presented a clarification of the species of *Myotis*, but lacks a complete and detailed analysis of the Argentine species. We basically follow La Val (1973), with modifications given in each species account. The difficulty in identifying Argentine *Myotis* is due primarily to poor knowledge about population and geographic variation, and the distribution of each species. Some of the taxonomic characters are not diagnostic, thus ecological data often must be used to clarify the status of a species. Some distinctive characters are: three lower and upper premolars, medium-sized ears with a sharply pointed tragus, and the presence of hairs on the dorsal base of the uropatagium (differing in this from *Eptesicus*). The skulls of many species are similar, so slight differences are often used as diagnostic characters, although these are frequently inconsistent. For this reason only those cranial characters that help in identification are mentioned in a species account and comparisons are made only with similar species.

The values obtained from specimens used in developing the key to species reflect the average values of specimens we examined.

Some species are easily distinguishable, e.g., *Myotis levis*, *M. albescens*, and *M. ruber*, although in some areas the first two species can be confused with one another. *Myotis nigricans* exhibits considerable variation and could be confused with other species. *Myotis chiloensis* could be confused with *M. aelleni*; their distributions are sympatric and the identity of either is problematic (see discussion of *M. chiloensis*). *Myotis riparius* could be confused with *M. nigricans* if the molars are not examined. *Myotis simus* is more easily identified by its short velvetlike fur and brilliant orange and yellow color. *Myotis keaysi* is similar to *M. nigricans*, although the forearm of *M. keaysi* is longer. Our identifications are based on an examination of Argentine specimens, a comparison with specimens from other areas, and the descriptions given by La Val (1973).

The dental formula is I 2/3, C 1/1, P 3/3, M 3/3, total 38.

Myotis aelleni Baud

Myotis aelleni Baud, Revue Suisse de Zoologie, 86:268, 1979.

Type Locality.—Argentina, Chubut, El Hoyo de Epuyén.

Distribution (Fig. 64).—Known only from the type locality and El Bolsón, Río Negro Province; both localities are in close proximity.

Description.—We did not examine the holotype or other specimens used in the original description; char-

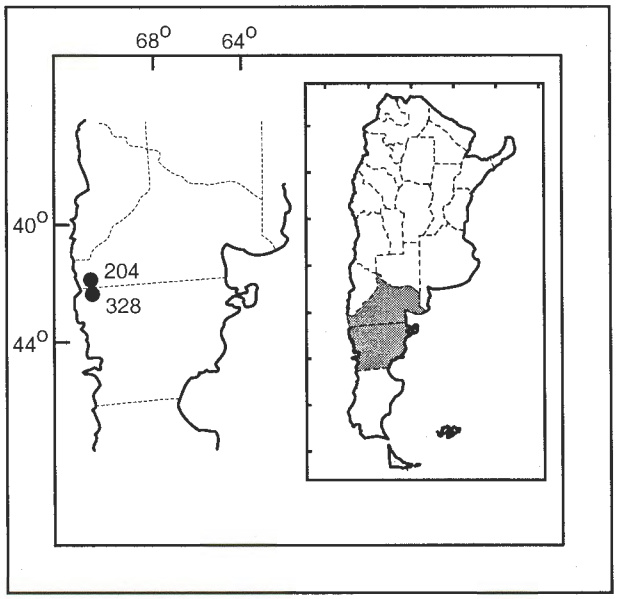


Figure 64. Map of localities of *Myotis aelleni*.

acteristics are from the literature (Baud, 1979). See also the discussion under the distribution section of *M. chiloensis*.

Size is medium; length of forearm is 37.7-41.2 mm. The skull is as wide, but shorter, than *M. l. levis*, and longer than *M. l. dinellii* and *M. chiloensis*, with marked frontal curvature. The occipital region is well developed and elevated above the sagittal crest (which is poorly developed in juveniles, but more pronounced in older animals). Generally, *M. aelleni* appears slightly more robust than either *M. l. dinellii* or *M. chiloensis*. The distal one-third of the outer edge of the ears is concave; when folded forward, the ears reach or slightly exceed the tip of the nose. The tragus is well developed, its outer edge slightly wavy. The pelage is darker above and paler below. The length of the hairs on the dorsum and the sides is at least 6 mm, but not more than 8 mm; the hair is not silky. The dorsal hairs are tricolored with a white basal band about 0.6 mm-1.0 mm in width, followed by a dark ash-brown band, and a terminal band of sepia-brown or cinnamon-brown (with a slight reddish tone near the rump and uropatagium). The uropatagium is not trimmed with white. There is little sexual dimorphism.

Comments.— Information on the biology of this species is given in Baud (1979).

Specimens Examined.— None.

Additional Records.— CHUBUT: Hoyo de Epuyén (Baud, 1979). RÍO NEGRO: El Bolsón (Baud, 1979).

Myotis albescens (É. Geoffroy St.- Hilaire)

Vespertilio albescens É. Geoffroy St.- Hilaire, Annales du Muséum d'Histoire Naturelle, Paris, 8:204, 1806.

Myotis albescens: Thomas, Annali di Museo Civico di Storia Naturale di Genova, ser. 2, 20:546, 1900.

Type Locality.—According to Cabrera (1958), the type locality is "Estancia San Solano" in extreme southern Paraguay, adjacent to the Estero de Ibera. This species has had a confused taxonomic history and neither a holotype nor a type locality was specified (La Val, 1973). Adding to the confusion, Acosta y Lara (1950) placed the type locality in Corrientes Province, Argentina. La Val (1973) designated an adult female, skin and skull, AMNH No. 205195, from Yaguarón, Paraguarí, Paraguay, as the neotype.

Distribution.— This species is distributed from southern Mexico to northern Argentina; it is not found in Chile or western Peru (Koopman, 1993).

Distribution in Argentina.— Figure 65.

Description (Figs. 66, 67, and 77g).— Length of the forearm ranges from 31.0 to 37.3 mm. Adults are easily identified, although specimens are similar to *M. l. levis* where they are sympatric in Buenos Aires and Entre Ríos provinces. Measurements of specimens from northwestern Argentina and from the province of Misiones are slightly larger than those of the neotype, but the characters are clearly those of the species. The pelage is soft and dense. Many dorsal hairs have white tips, giving this bat a silvery or golden tint (this frosted appearance is found in few other species, excepting some *M. l. levis*). The venter is light colored, almost pure white on the abdomen and perianum and on the sides of the body. In general, specimens from Misiones Province are darker than those from northwestern Argentina; the fringe of hairs on the border of the uropatagium is well marked, even more so than in *M. l. dinellii*. The feet are robust and rounded, similar to those of molossids. The braincase is globose; the rostrum is short; the postorbital constriction is wide (generally >

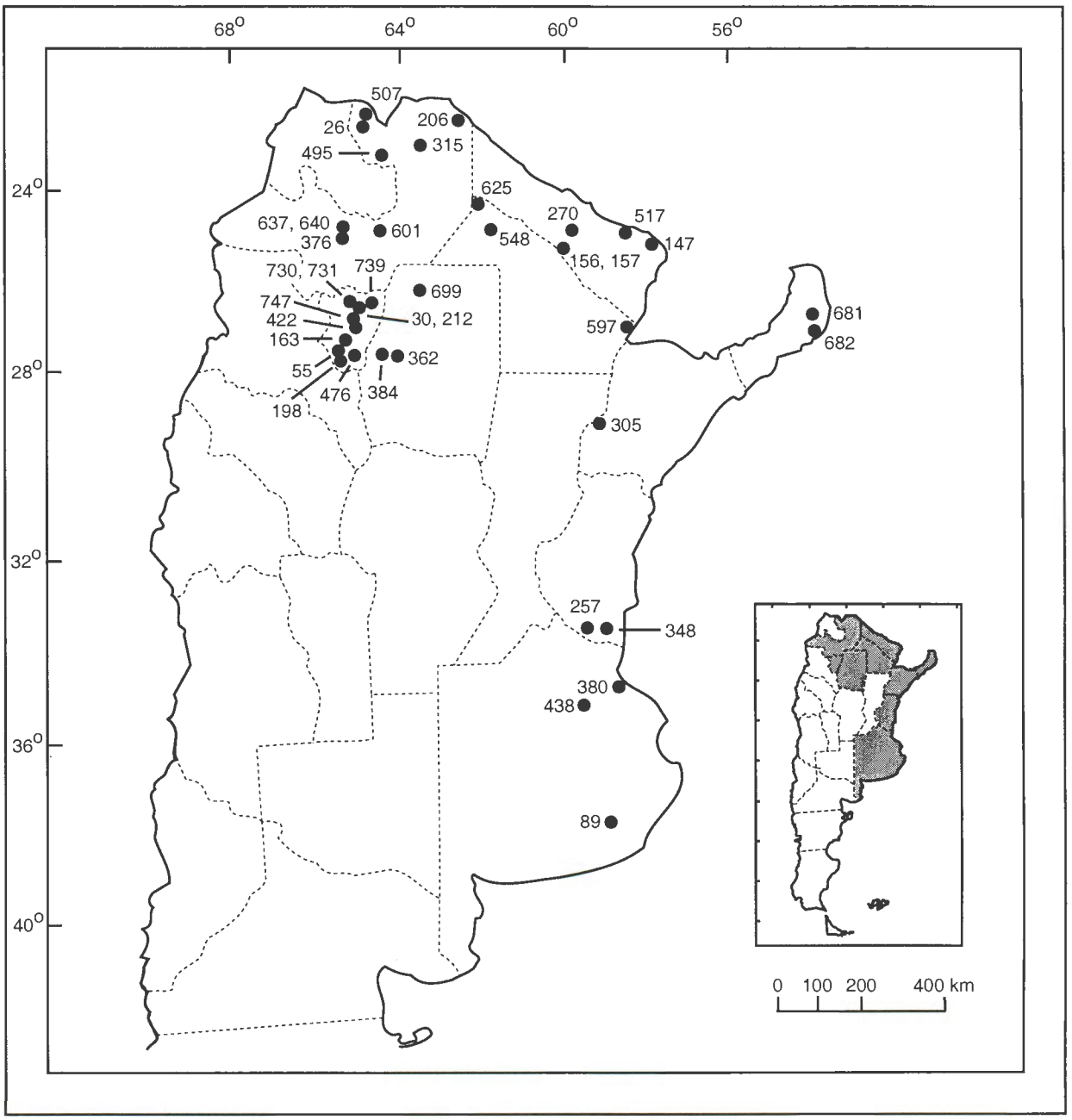


Figure 65. Map of the localities of *Myotis albescens*.

4 mm); the frontal curvature is accentuated; and there is no sagittal crest.

Measurements.— Table 8.

Comments.— Little is known about the biology of this species in spite of its wide distribution. Specimens have been captured in human dwellings. We captured individuals: as they left the roof of a rural dwelling in Tucumán Province; over a gully with calm water in moist forest; in areas of open chacoan thorn scrub; and under the eaves of a small building in the dry thorn scrub of Santiago del Estero Province, which they shared with *Myotis nigricans*, *M. riparius*, and *Molossus molossus*. Acosta y Lara (1950) reported that the species lives in human dwellings, rock crevices, near running water, and under tree bark. Myers (1977) indicated

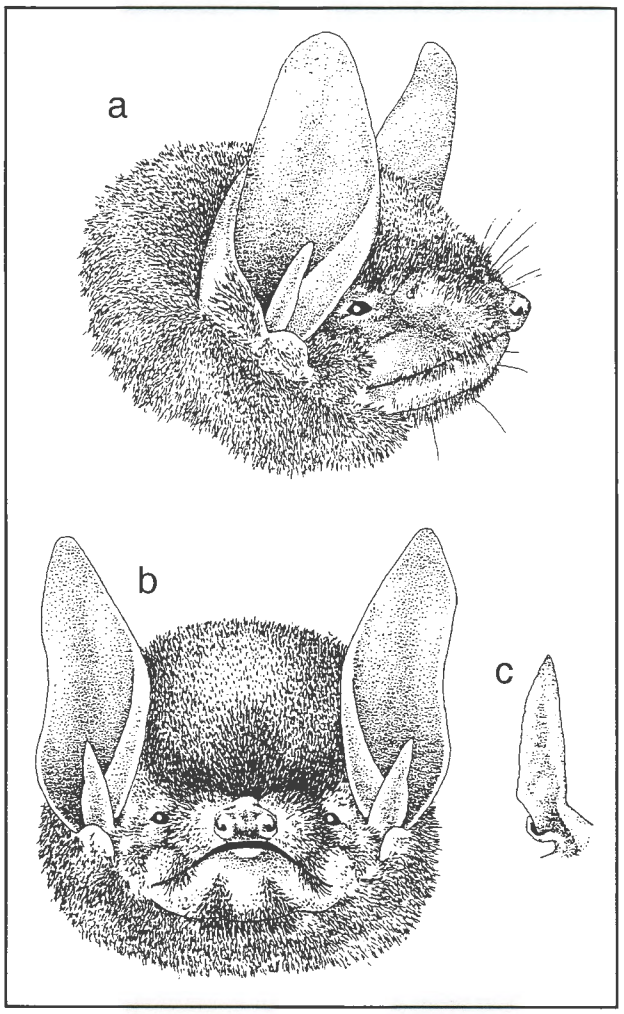


Figure 66. *Myotis albescens*: (a) face, lateral view; (b) face, frontal view; and (c) tragus.

that in Paraguay it roosts in buildings dating from the last century.

Reproduction is poorly known. Myers (1977) suggested that delayed fertilization may occur; mating was observed in May and pregnant females appeared at the end of July. Sexual dimorphism has been reported (Myers and Wetzel, 1983).

Specimens Examined (85).— BUENOS AIRES: Bosch, 15 km NW Balcarce, 1 (MSU); La Plata, 2 (MLP); Lobos, 1 (ROM). CHACO: Pozo del Gato, 2 (1 CML, 1 IADIZA-CM); Río de Oro, General Vedia, 2 (1 CML, 1 FCM); Río Teuco, 10 km W Tartagal, 2 (CML). CORRIENTES: Goya, 2 (BMNH). ENTRE RÍOS: Estación Paranacito, 1 (FCM); Islas de Ibicuy, Paranacito, 13 (TTU). FORMOSA: Clorinda, 1 (TTU); Colonia km 503, 2 (1 CML, 1 IADIZA-CM); Colonia km 503, 16 km S, 2 (1 CML, 1 IADIZA-CM); Estanislao del Campo, 1 (TTU). MISIONES: Misiones (no specific locality), 1 (BMNH); San Pedro, 26 km NE, sobre ruta 16, 1 (CML); San Pedro, 47 km SE, 2 (1 CML, 1 IADIZA-CM). SALTA: Aguas Blancas, 27 km W, 1 (MACN); Hickman, Luna Muerta, 1 (CML); La Merced, 2 (TCWC); Orán, 15 km S, 15 km W, along Río Santa María, 1 (CM); Parque Nacional Baritú, Finca Lipeo, a 15 km de Las Juntas, 600 m, 1 (CML); Río El Naranjo, 14 km W de Ruta provincial 5, 1 (CML). SANTIAGO DEL ESTERO: Santo Domingo, 24 (7 CML, 5 IADIZA-CM, 12 OMNH). TUCUMÁN: Aguas Chiquitas, Sierras de Medina, 800 m, 1 (CM); Arroyo El Saltón, Reserva Provincial Santa Ana, 1 (CML); Concepción, 1 (MACN); Dique San Ignacio, 4 (3 CML, 1 OMNH); El Cadillal, Usina, 3 (RMB); Las Talas, 4 km al N de Bella Vista, 1 (OMNH); Monteagudo, 4 (2 FCM, 1 MACN, 1 TTU); Ticucho, 3 km E, 1 (OMNH); Ticucho, entrando por cola del Dique El Cadillal, 1 (OMNH); Tranquitas, 1 (MACN).

Additional Records.— FORMOSA: Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.). SALTA: El Breal (Mares et al., 1981); Salta (La Val, 1973); Salta, casa habitada (Villa-R. and Villa-C., 1971). SANTIAGO DEL ESTERO: La Banda (Romaña and Abalos, 1950); La Puerta (Romaña and Abalos, 1950). TUCUMÁN: Tucumán, ciudad (Romaña and Abalos, 1950).

Myotis chiloensis (Waterhouse)

Vespertilio chiloensis Waterhouse, Mammalia, *In* C. Darwin (ed.). The zoology of the voyage of H.M.S. Beagle, under command of Captain Fitzroy, R. N., during the years 1832 to 1836. 5 pts., 97 pp. Smith, Elder, and Co., London, p. 5, 1840.

Myotis chiloensis: Cabrera, Revista Chilena de Historia Natural, 7:295, 1903.

Type Locality.— The holotype was from a small island east of the Isla de Chiloe, Chile. It has not been located in the BMNH and apparently is lost (Miller and Allen, 1928; La Val 1973; Carter and Dolan, 1978). Consequently, La Val (1973) designated a neotype (female FMNH 24029), from Cucao, Isla de Chiloe, Chile.

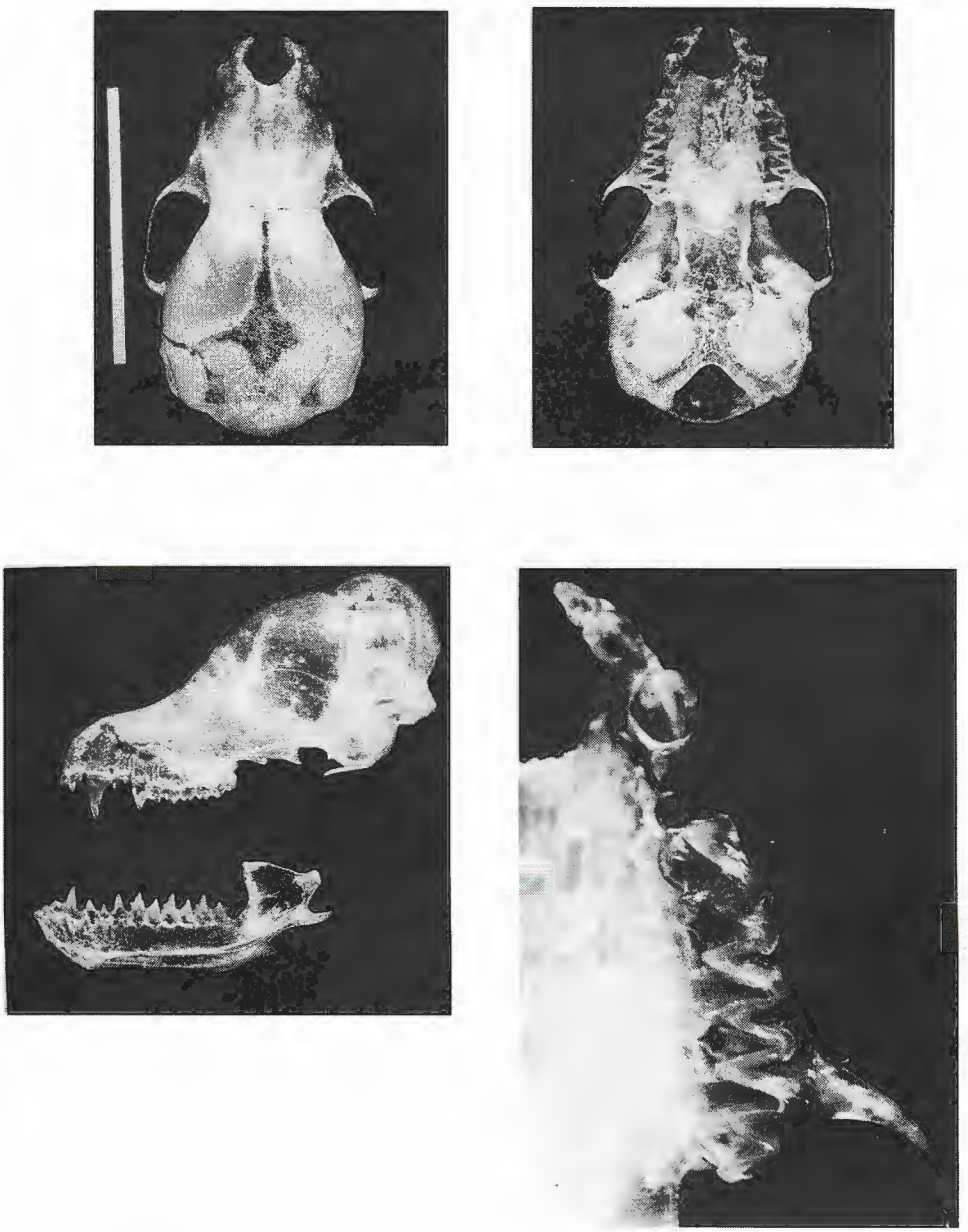


Figure 67. Skull and teeth of *Myotis albescens*. Adult female from Dique San Ignacio, Tucumán Province (OMNH 18877). Bar = 1 cm. Teeth not to scale.

Distribution.— Restricted to Chile by La Val (1973), but included in Argentina by Crespo (1974). Cabrera (1958) considered *M. chiloensis* a polytypic species, listing as subspecies *M. c. alter* and *M. c. chiloensis*, among others not analyzed in this study; he also considered *M. dinellii* as a synonym of *M. c. atacamensis*. Later, La Val (1973) recognized *M. chiloensis* and *M. atacamensis* as valid monotypic species, restricting the distribution of the former to central and southern Chile and the latter to the coastal desert of northern Chile and Peru. La Val (1973) also recognized *M. levis* as a polytypic taxon, including as a subspecies *M. l. dinellii*; *M. c. alter* was recognized as a synonym of *M. l. levis*.

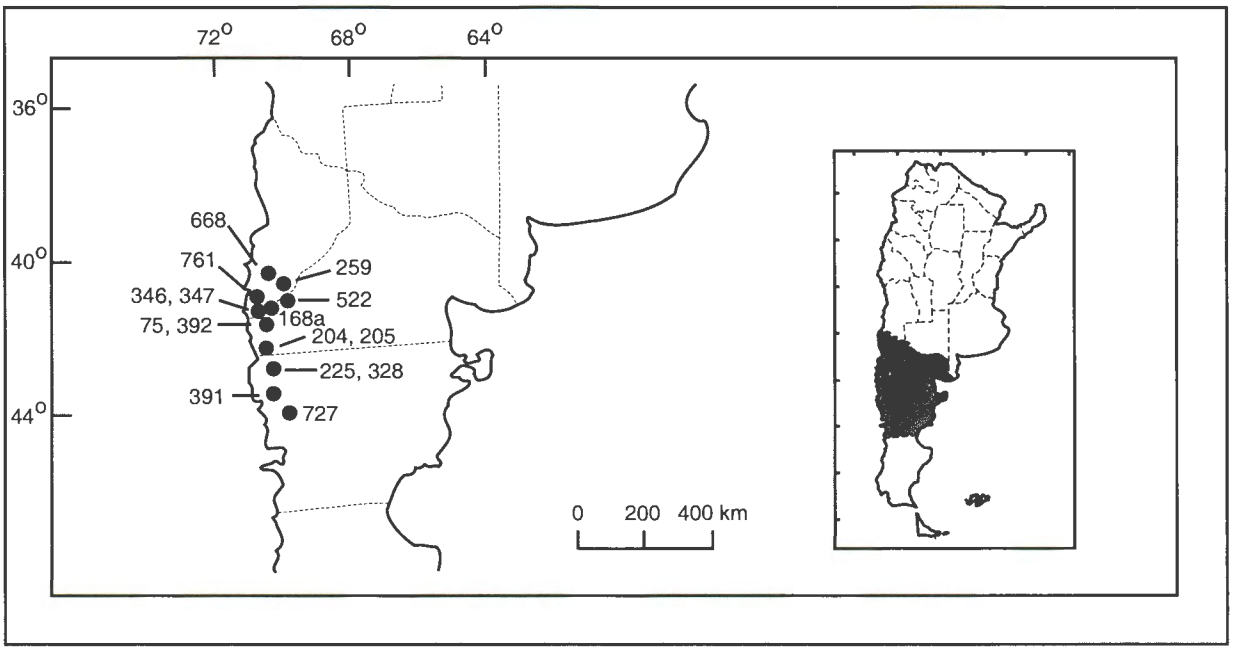


Figure 68. Map of the localities *Myotis chiloensis*.

Thus, La Val (1973) considered *M. chiloensis* to be a monotypic species restricted to Chile, but with a probable extension to Isla Navarino south of Tierra del Fuego. This extension was based on a specimen in the AMNH mentioned by Koopman (1967). This specimen, as well as those mentioned by Olrog (1950) in the CML, and a specimen from Río Douglas from Tierra del Fuego, Chile, are all *M. chiloensis* (R. M. Barquez, personal observation).

From an examination of specimens from the provinces of Chubut, Río Negro, and Neuquén, Crespo (1974) included *M. c. chiloensis* in Argentina and extended the distribution of *M. c. atacamensis* (= *M. levis dinellii*) to Isla Victoria, Neuquén Province where, according to him, there is a clear separation between both geographic forms. We consider *M. chiloensis* and *M. levis* to be distinct species and do not agree that the former should be restricted to Chile, as stated by La Val (1973). We also doubt the range extension of *M. l. dinellii* given by Crespo (1974), since we have not been able to find his specimens in the MACN.

We have examined many specimens of *M. chiloensis* from different localities. All are quite different from *M. l. dinellii*, both in appearance and in cranial and external measurements. Specimens from San Martín de los Andes, 71 km SE, are lighter dorsally than specimens from other localities, but they are not comparable to *M. l. dinellii*; the coloration may be a color phase, or seasonal or environmental variation. These specimens resemble *M. aelleni* and have similar measurements, but differ in other characters. We have not been able to examine the type and type series of *M. aelleni*, but from an examination of many specimens from the region, including some collected at the same locality, on the same date, and by the same collector as those of the type of *M. aelleni*, we feel that the validity of *M. aelleni* is questionable.

All specimens examined pertain to *M. chiloensis*, including those from El Hoyo (the type locality of *M. aelleni*). Although the cranial and external measurements overlap those of *M. aelleni*, the specimens lack the tricolored dorsal hairs that characterize *M. aelleni*.

Distribution in Argentina.— Figure 68.

Description (Fig. 69).— Specimens from Argentina have a forearm length ranging between 37.0 and 39.8 mm. Color varies from blond in the north to dark brown in the south. Dorsal hairs measure between 4 and 7 mm; the basal three-fourths are light brown or black and the tips are blond, light brown, or gray-brown. Ventrally, hair bases are dark brown to black and the tips are light brown, gray, or whitish. The contrast between the bases and the tips is more accentuated in speci-

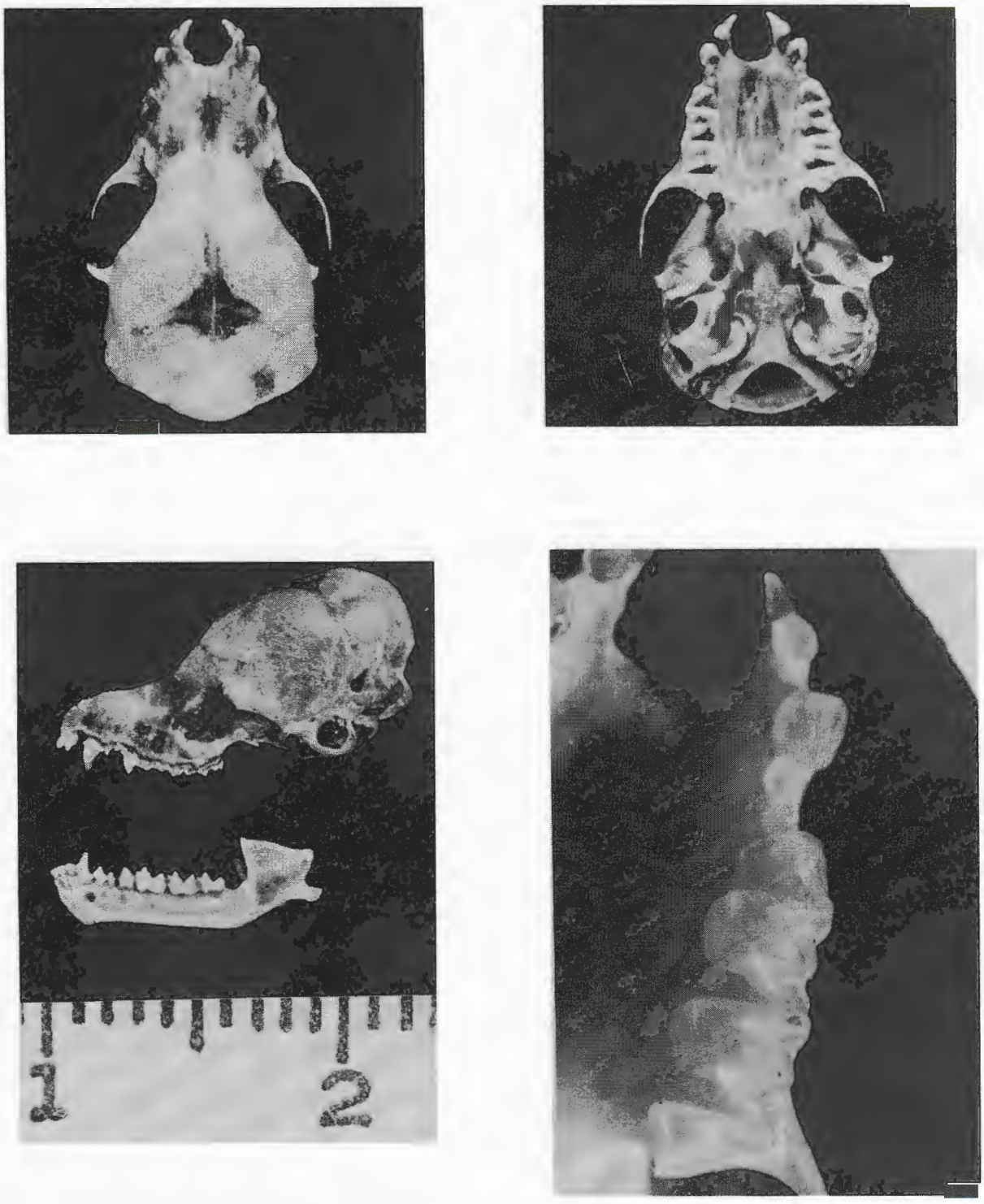


Figure 69. Skull and teeth of *Myotis chiloensis*. Adult female from Hoyo de Epuyen, Chubut Province (MACN).

Table 8. Measurements of Myotis albescens, Myotis chiloensis, *and* Myotis keaysi. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Myotis albescens*	*Myotis chiloensis*	*Myotis keaysi*
Total length	81.8 ± 6.34, 19 68.0 - 94.0	90.0 ± 4.28, 24 82.0 - 98.0	93.0 ± 2.73, 5 90.0 - 97.0
Tail length	31.5 ± 3.36, 19 24.0 - 36.0	37.4 ± 1.86, 24 35.0 - 41.0	44.4 ± 2.40, 5 41.0 - 47.0
Hindfoot length	7.3 ± 0.96, 19 6.0 - 8.9	8.4 ± 0.87, 24 7.0 - 10.0	7.2 ± 0.44, 5 7.0 - 8.0
Ear length	13.4 ± 2.05, 19 9.0 - 15.7	14.5 ± 1.18, 24 12.0 - 17.5	11.2 ± 0.44, 5 11.0 - 12.0
Forearm length	35.1 ± 1.49, 19 31.0 - 37.3	38.6 ± 0.79, 24 37.0 - 39.8	40.6 ± 0.89, 5 40.0 - 42.0
Weight	7.4 ± 1.61, 13 4.0 - 11.0	7.5 ± 0.92, 18 6.3 - 10.3	10.0, 1
Condylobasal length	13.0 ± 0.34, 13 12.7 - 13.8	13.6 ± 0.22, 21 13.3 - 14.2	13.0 ± 0.18, 5 12.8 - 13.3
Least interorbital breadth	4.8 ± 0.17, 12 4.6 - 5.2	4.9 ± 0.14, 21 4.7 - 5.2	4.6 ± 0.05, 3 4.6 - 4.7
Zygomatic breadth	8.6 ± 0.14, 6 8.5 - 8.9	9.1 ± 0.15, 19 8.8 - 9.3	8.4 ± 0.07, 2 8.4 - 8.5
Greatest length of skull	13.9 ± 0.33, 13 13.6 - 14.7	14.4 ± 0.22, 21 14.1 - 15.0	13.7 ± 0.26, 5 13.5 - 14.1
Postorbital constriction	4.0 ± 0.10, 13 3.9 -4.3	3.8 ± 0.09, 21 3.6 - 4.0	3.6 ± 0.05, 5 3.6 - 3.7
Breadth of braincase	7.2 ± 0.18, 13 6.8 - 7.5	7.1 ± 0.23, 21 6.6 - 7.5	7.0 ± 0.08, 5 6.9 - 7.1
Length of maxillary toothrow	5.1 ± 0.20, 13 4.9 - 5.6	5.6 ± 0.10, 21 5.4 - 5.9	5.2 ± 0.13, 5 5.1 - 5.4
Palatal length	6.5 ± 0.35, 11 6.1 - 7.2	7.1 ± 0.15, 19 6.9 - 7.5	6.7 ± 0.24, 5 6.4 - 7.0
Mastoidal breadth	7.3 ± 0.15, 13 7.1 - 7.7	7.4 ± 0.27, 21 6.4 - 7.8	7.3 ± 0.11, 5 7.2 - 7.5
Length of mandibular toothrow	5.2 ± 0.20, 12 5.0 - 5.6	5.8 ± 0.14, 21 5.7 - 6.1	5.6 ± 0.08, 5 5.5 - 5.7
Length of mandible	10.1 ± 0.18, 12 9.8 - 10.5	10.8 ± 0.84, 21 10.3 - 13.3	10.3 ± 0.11, 5 10.2 - 10.5
C-C (width across canines)	3.8 ± 0.56, 13 3.5 - 5.7	3.8 ± 0.08, 20 3.7 - 4.0	3.6 ± 0.05, 5 3.6 - 3.7
M-M (width across molars)	5.5 ± 0.13, 13 5.3 - 5.7	5.9 ± 0.12, 21 5.8 - 6.2	5.4 ± 0.08, 5 5.3 - 5.5

mens from the north. The hairs of a specimen from Río Douglas, Chile, are fairly uniform dorsally, the tips are lightly lighter than the bases; the venter is more bicolored, but never as much as in *M. l. levis*. Wing membranes vary in color; in some they are dark, almost black, while in others they are light brown or gray-brown. The posterior border of the uropatagium lacks a fringe of hairs and is never white as in *M. l. levis*, with which it is frequently confused.

The skull is robust, the braincase globose, and the rostrum elongated; a sagittal crest is present but generally low.

Measurements.— Table 8.

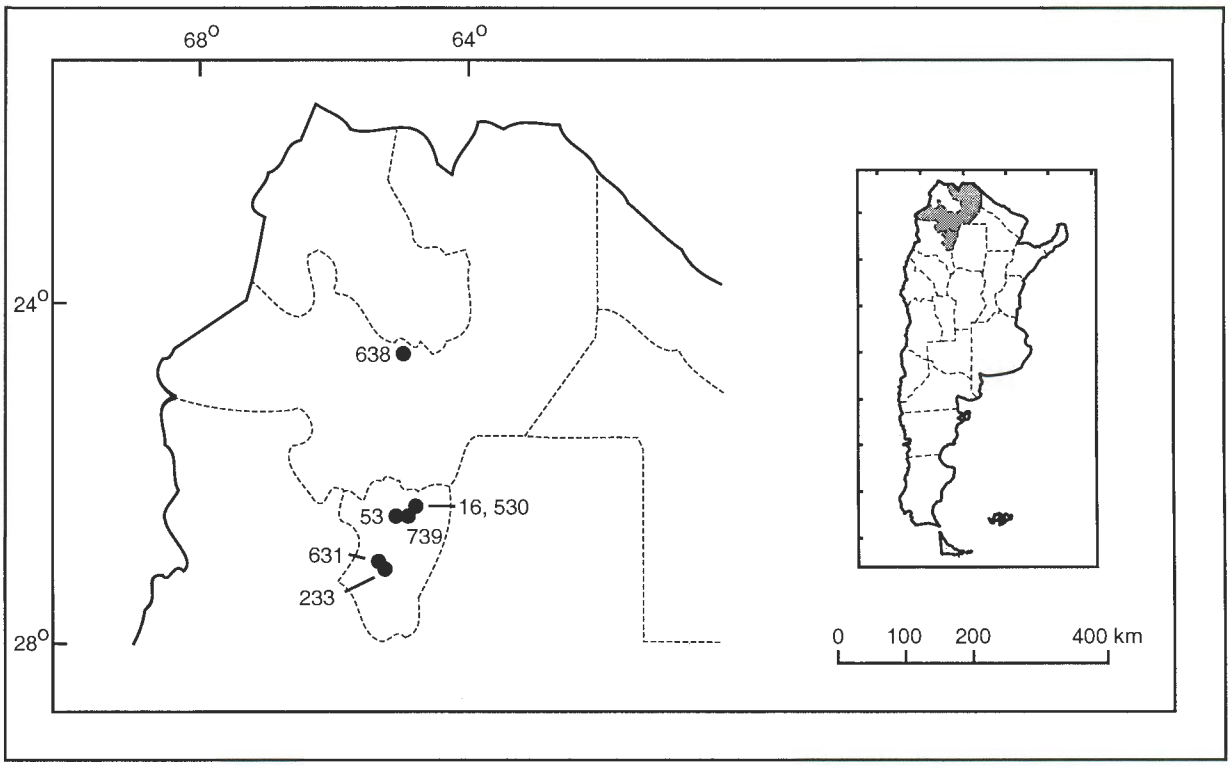


Figure 70. Map of the localities of *Myotis keaysi.*

Comments.— Prior to the work of Pearson and Pearson (1989) in western Patagonia, almost nothing was known about the biology of this species in Argentina. The Pearsons found *M. chiloensis* roosting in a garage with a large attic, in a barn, in an abandoned house, under a tin roof, and in a deep crevice in a cliff. Bats were breeding from October through December (summer), and were not breeding (and torpid) in the winter months of April and May. Females in five colonies all gave birth at about the same time over a two-week period. Additional information suggested that many, if not most, females do not give birth the same year that they are born. Koopman (1967) found remains of a fly (Tipulidae) in the mouth of a specimen. Greer (1966) commented that it flies low over plantation areas and high in open zones above swampy areas. Mann Fischer (1978) reported that the daytime roosts vary according to the environment, and include cracks under bark in forests of southern Chile and roofs in central Chile. He noted that *M. chiloensis* used rocky caves in the northern deserts, but this was probably *M. atacamensis*. Mann Fischer (1978) indicated that bats hibernated during the winter in colder regions and accumulated fat in the interscapular space. Bozinovic et al. (1985) studied the energetics of this species in Chile: in a group of bats collected in a mine shaft and examined in the laboratory, they found that the species undergoes a brief period of euthermy (2-3 hours/day) followed by a long period of torpor (21-22 hours/day).

Specimens Examined (48).— CHUBUT: El Hoyo, 14 (1 CML, 13 MVZ); Hoyo de Epuyén, 6 (MACN); Lago Futalaufquén, 1 (MACN); Tecka, 3 km N, along Hwy 40, 2 (1 CML, 1 OMNH). NEUQUÉN: Isla Victoria, 3 (2 MACN, 1 MVZ); Isla Victoria, Piedras Blancas, 1 (CML); San Martín de los Andes, 71 km SE, 5 (MVZ); Villa La Angostura, 19 km N, along Hwy. 234, 4 (2 CML, 1 IADIZA-CM, 1 OMNH). RÍO NEGRO: El Bolsón, 9 (7 MACN, 2 MVZ); El Bolsón, 3 km N, 1 (MVZ); Lago Perito Moreno, 1 (MVZ); Paso Flores, 1 (MVZ).

Additional Records.— NEUQUÉN: Corral de Piedras (40°27'S) (Pearson and Pearson, 1989); Estancia Alicura (Pearson and Pearson, 1989); Estancia Chacabuco (Pearson and Pearson, 1989). RÍO NEGRO: Bariloche, 4 km W (MVZ, not examined).

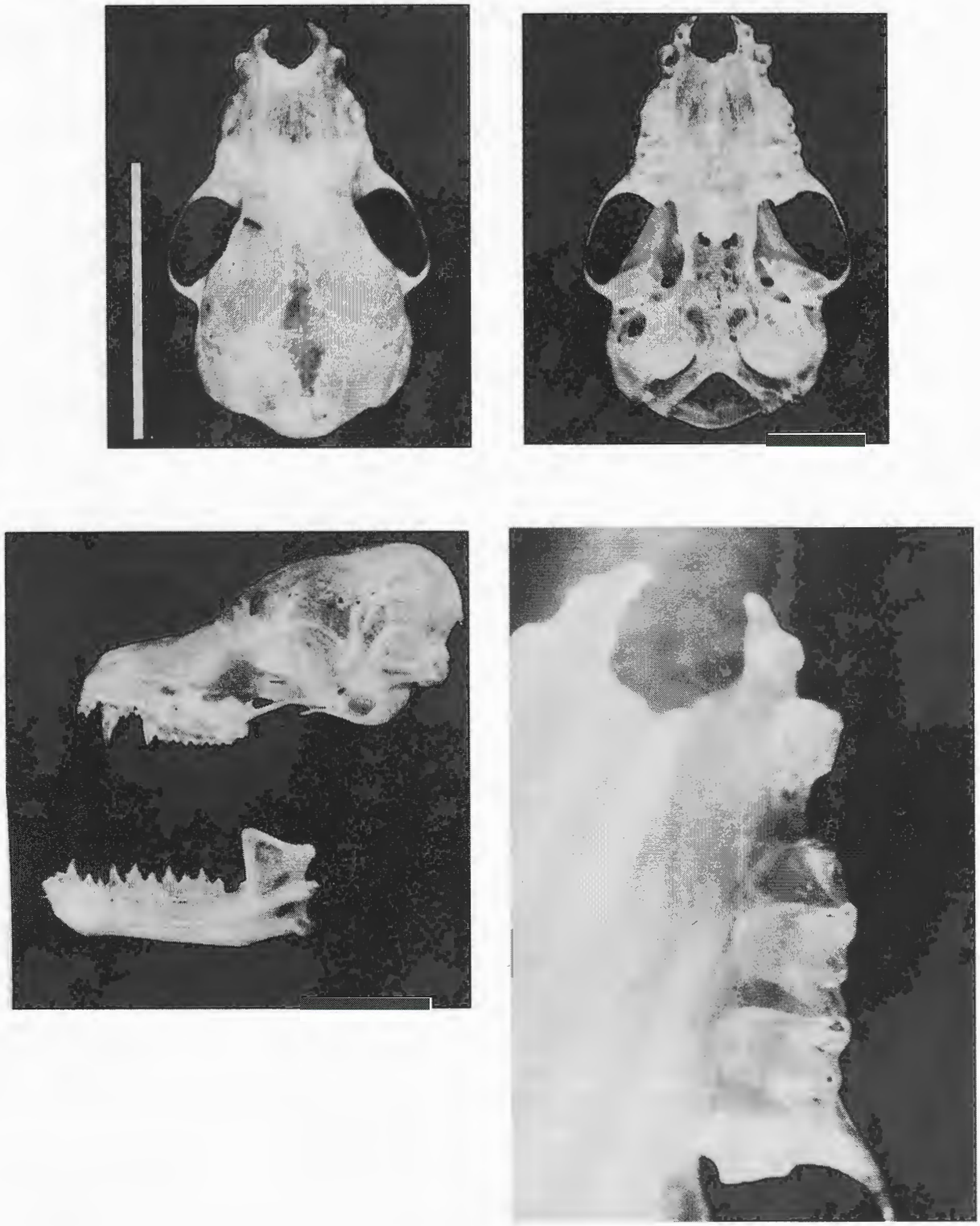


Figure 71. Skull and teeth of *Myotis keaysi*. Adult female from Agua Colorada, Tucumán Province (MACN). Bar = 1 cm. Teeth not to scale.

Myotis keaysi J. A. Allen

Myotis ruber keaysi J. A. Allen, Bulletin of the American Museum of Natural History, 33: 383, 1914.

Myotis keaysi keaysi: La Val, Los Angeles County Museum of Natural History Science Bulletin, 15:22, 1973.

Type Locality.— Perú, Puno, Inca Mines.

Distribution.— According to La Val (1973), *M. k. keaysi* is found only in the Andes of South America, in Colombia, Ecuador, and Peru. Anderson et al. (1982) reported it from the departments of Tarija and Chuquisaca, Bolivia. Koopman (1982) showed the distribution as including northwestern Bolivia. *Myotis k. pilositabilis* is found only in northern Venezuela.

Distribution in Argentina.— Figure 70.

Description (Fig. 71).— Six specimens from Argentina collected by A. Fornes and identified as *M. nigricans* were compared with specimens of *M. keaysi* in the AMNH from Peru and Ecuador, and with the type specimen (AMNH 15814). The specimens from Argentina are *M. keaysi*, although they differ in small details that can be ascribed to geographic or individual variation. We later added several specimens from Tucumán Province, and they show the characteristic larger size of *M. keaysi*, in which the forearms are greater than 40 mm (they rarely exceed 35 mm in *M. nigricans*).

The body appears robust. The pelage extends over at least one-third of the uropatagium and over the knee, although hair is not visible on the tibia. General color is dark brown with the dorsal hairs lightly bicolored, their bases darker. Many hairs have lighter tips, although without giving a frosted appearance. Ventral coloration is similar to that of *M. l. dinellii*, with the bases of the hairs dark brown, almost black, and the tips cream or light brown. The ears are large and rounded, their internal margin quite convex; the distal one-half of the external margin is almost straight or slightly concave and the basal half is strongly convex. The tragus is long, reaching half the length of the ear, and the tip is pointed (except for the dark tip, the tragus is pale colored). Wings and the uropatagium are wide and well developed.

The skull is small, similar to *M. nigricans*, but with a weakly developed sagittal crest. Other species with sagittal crests include *M. ruber* and *M. riparius*, but are geographically isolated from *M. keaysi*; *M. ruber* is reddish in color with a larger skull.

Measurements.— Table 8.

Comments.— Little is known about the biology of this species. Data indicate a distribution associated with moist forests of the Andes; most localities are above 2000 m (only a few lie between 1100 and 1800 m). Known localities in northeastern Tucumán are a mixture of transitional and montane forests near chacoan thorn scrub vegetation and isolated from the main mountain chain to the west.

Specimens Examined (12).— SALTA: Salta Capital, 1 (MACN). TUCUMÁN: Agua Colorada, 4 (3 MACN, 1 TTU); Arroyo Aguas Chiquitas, Reserva Provincial Aguas Chiquitas, 2 (CML); El Nogalar, Ruta 307, 1700 m, 1 (CML); Piedra Tendida, 12 km WNW Burruyacú along Río Cajón, 2,500 ft., 1 (OMNH); Ruta 307, 6 km S cruce con ruta a El Mollar, 1 CML); Tranquitas, 2 (1 CML, 1 MACN).

Myotis levis (I. Geoffroy St.- Hilaire)

Vespertilio levis I. Geoffroy St.-Hilaire, Annales des Sciences Naturelles, Paris, ser. 1, 3:444-445, 1824.

Myotis levis: La Val, Los Angeles County Museum of Natural History Science Bulletin, 15:36, 1973.

Type Locality.— "Southern Brazil."

Distribution.— Known only from southern Brazil, southern Paraguay, Uruguay, Argentina, and southern Bolivia. Two subspecies are recognized: *M. l. levis* in eastern Argentina, including coastal Buenos Aires Province; and *M. l. dinellii* from southeastern Buenos Aires Province northward in a narrow band to Salta Province and southern Bolivia.

Description (Figs. 72, 73, and 77h).— Since there are two subspecies of this species in Argentina, we describe *M. levis* by comparing the morphology of the two subspecies. The subspecies are difficult to distinguish except by size. *M. l. levis* is slightly larger, there is less contrast between the bases and the tips of the dorsal hairs, and the feet are slightly more robust. In general, the subspecies can only be separated based on distribution and measurements. The description that follows emphasizes subspecific differences.

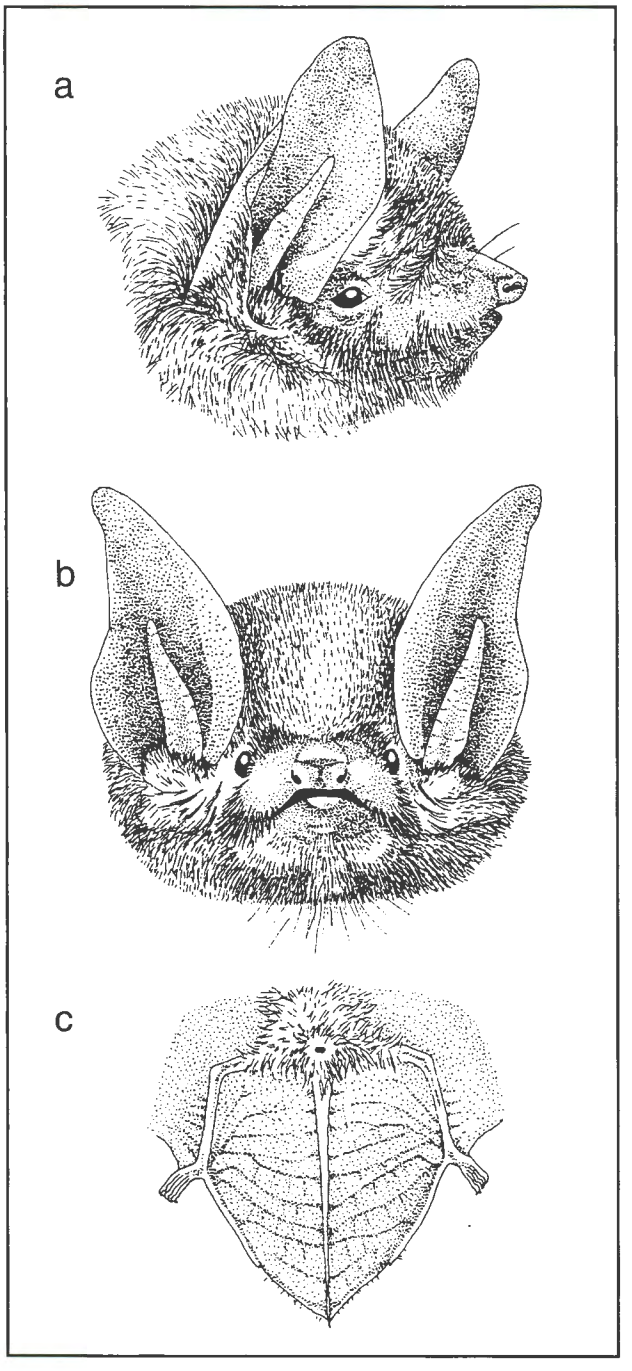


Figure 72. *Myotis levis*: (a) face, lateral view; (b) face, frontal view; and (c) uropatagium.

Size is medium; length of forearm ranges from 35 to 41 mm, less than 38 mm in *M. l. dinellii*. Hairs of the dorsum are bicolored, with the bases very dark brown or black; the tips are lighter, generally yellowish in *M. l. dinellii* and brown in *M. l. levis*. Bicoloration appears to vary with age and is indistinct in juveniles. Ventrally, the bases of the hairs are dark, almost black, but the tips are cream colored. The membranes are completely naked dorsally, except for the fringe of hairs on the base of the uropatagium that is characteristic of the species, a trait that is more evident in specimens from the provinces of Buenos Aires and Entre Ríos (*M. l. levis*). Ventrally, the pelage extends to the sides of the body and over the plagiopatagium and uropatagium; the latter is paler than the former. The ears are medium size, narrower, smaller, and less rounded, than in *M. chiloensis*. Some specimens from Hickman, Salta Province, are paler, resembling *M. albescens*.

The skull is quite robust, the rostrum elongated, and the postorbital constriction narrow, generally less than 4 mm and even less in *M. l. dinellii*. *M. levis* from Buenos Aires and Entre Ríos provinces is easily separated from *M. albescens* by an examination of the skull. Generally, in *M. albescens* the mandibular toothrow, the maxillary toothrow, and the palate are smaller, while the postorbital constriction and braincase are larger.

Comments.— In spite of a being a very abundant species, little is known of its biology. A difficulty is that specimens in museums frequently are misidentified as *M. l. levis* that are, in fact, other species.

Lactating females have been found from late December to late January in Aguas Chiquitas, Tucumán Province; in mid-January in Cuesta de la Sébila, Catamarca Province; and in Ñacuñan, Mendoza Province in mid-December. A pregnant female with a small fetus was collected in October in Las Juntas, Catamarca Province. Juveniles have been recorded in the middle of May in San Esteban, Córdoba Province and in early January in Amaicha del Valle, Tucumán Province.

With respect to *M. l. levis*, data are even more scarce. Some specimens in the TCWC collections from Delta del Paraná de las Palmas, Buenos Aires Province, and Departamento Gualeguaychú, Entre Ríos Province, collected in mid-January had cartilaginous phalanges.

Myotis levis dinellii Thomas

Myotis dinellii Thomas, Annals and Magazine of Natural History, ser. 7, 10:493, 1902.

Myotis levis dinellii: La Val, Los Angeles County Museum of Natural History Science Bulletin, 15:39, 1973.

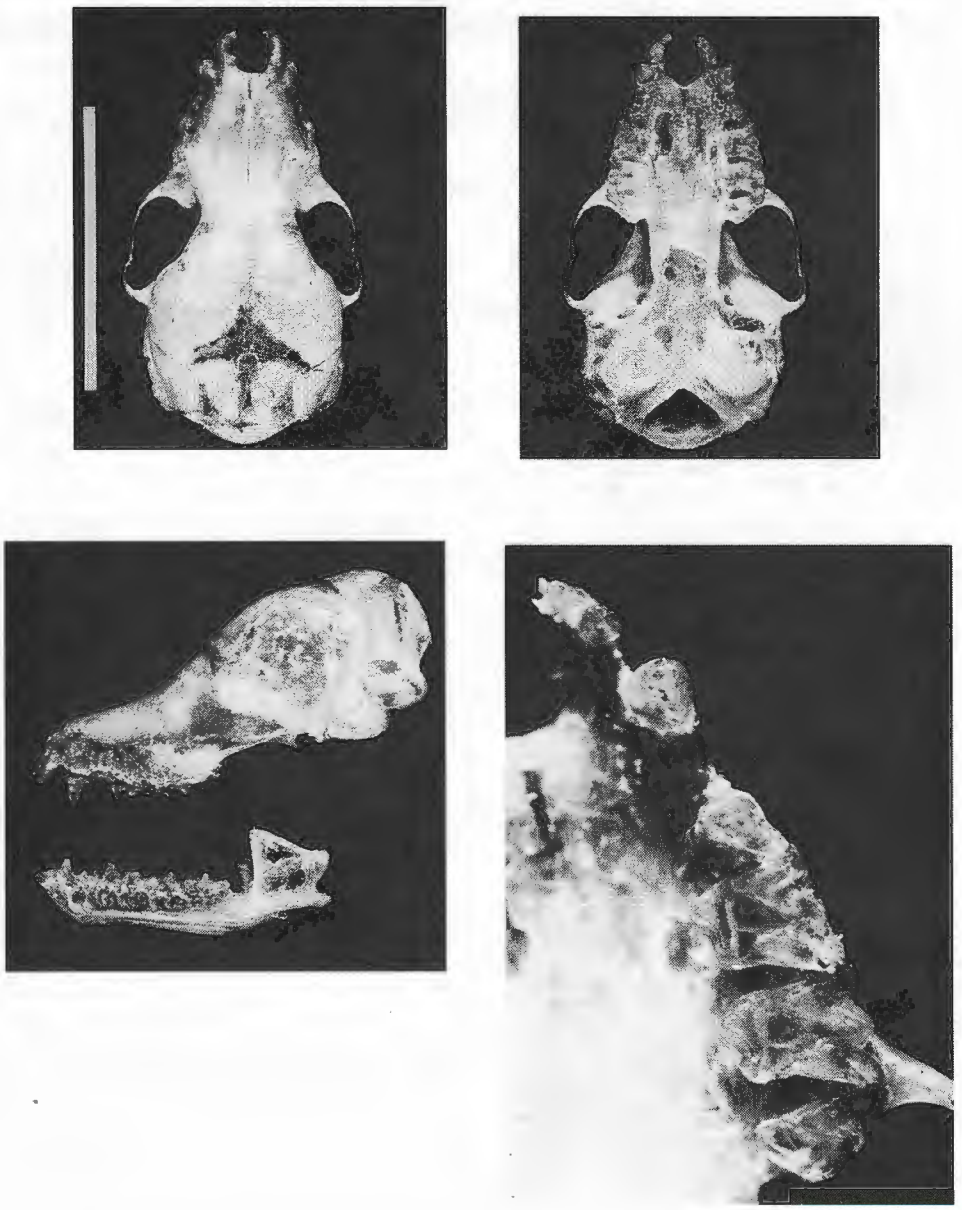


Figure 73. Skull and teeth of *Myotis levis dinellii*. Adult male from Dique San Ignacio, Tucumán Province (CML 3162). Bar = 1 cm. Teeth not to scale.

Type Locality.— Argentina, Tucumán, 456 m.

Distribution in Argentina.— Figure 74.

Measurements.— Table 9.

Specimens Examined (298).— CATAMARCA: Andalgalá, 2 (CM); Andalgalá, 4 km S, 3 (2 CM, 1 MSB); Balneario El Caolín, 6 km NW Chumbicha, 4 (OMNH); Balneario Municipal Capayán, Chumbicha, 1 (OMNH); Chumbicha, 1 km N and W of balneario by road, 2,600 ft., 34 (9 CML, 9 IADIZA-CM, 16 OMNH); Cuesta del Clavillo, 5 km S La Banderita, 2 (CML); Cuesta La Sebila, Hwy 60, 2 (CM); El Rodeo, 900 m, 1 (CML); El Rodeo-La Junta, 2 (CML); Estancia Alto las Juntas, 2 (CML); Las Juntas, Estancia de los Figueroa, 50 km NW Catamarca Ciudad, 3 (OMNH); Mollecito,

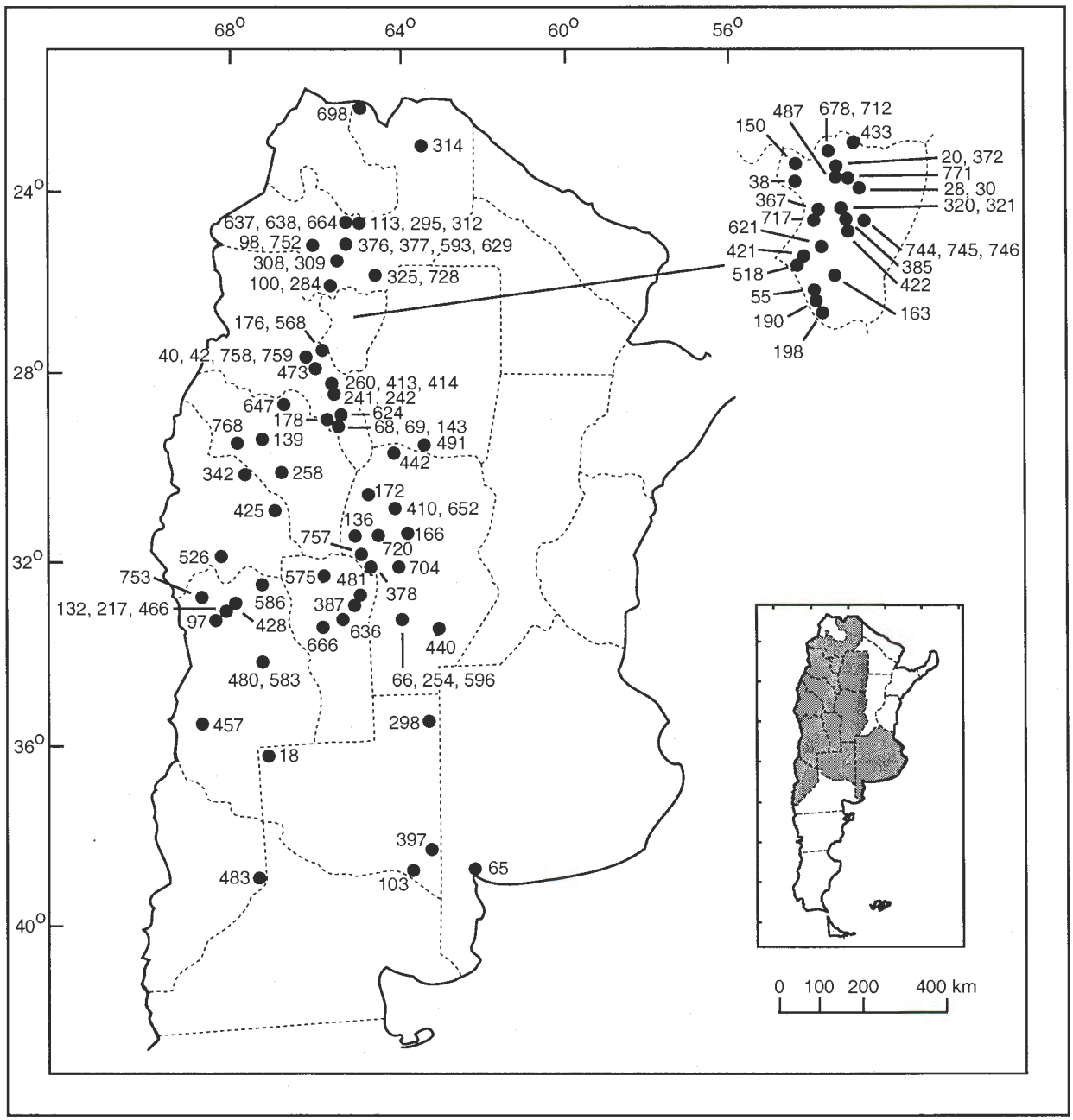


Figure 74. Map of the localities of *Myotis levis dinellii.*

30 km SE Andalgalá, 3 (CML); Puesto Fronterizo 6 km W La Banderita, 6 (CML); Río San Pablo, 3 km NW Concepción, 1 (CM); Villa El Potrero, 1 (CML); Villa El Potrero (N Andalgalá), El Potrero, 1 (CM). CÓRDOBA: Baigorria, 1 (CUNRC); Chancaní, 1 (CUNRC); Córdoba, 9 (USNM); Cruz del Eje, 1 (CUNRC); La Paz, 6 (MACN); Las Estancias, 2 (CML); Los Cisnes, 4 (MACN); Los Hoyos, 1 (MACN); Río Cuarto, 3 (SUVM); San Esteban, 1100 m, 3 (2 CML, 1 OMNH); Tala Cañada, 1250 m, 2 (MACN); Villa Dolores, 6 (TTU). LA PAMPA: Caleu Caleu, 8 (1 FMNH, 7 MACN); General Pico, 1 (MACN); Laguna Colorada Grande, Caleu Caleu, 2 (MACN). LA RIOJA: Chilecito, 6 (MACN); Estación Patquía, Guayapa, 1 (CML); San Blas de los Sauces, 4 km SE San Blas, 9 (CML); Villa Unión, 9 (MACN). MENDOZA:

Table 9. Measurements of Myotis levis dinellii, Myotis levis levis, *and* Myotis nigricans. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Myotis levis dinellii*	*Myotis levis levis*	*Myotis nigricans*
Total length	86.0 ± 4.81, 39 77.0 - 97.0	89.0 ± 7.78, 15 72.0 - 99.0	81.3 ± 5.01, 20 74.0 - 92.0
Tail length	38.1 ± 3.95, 34 22.0 - 44.0	38.0 ± 4.08, 15 27.0 - 41.0	35.2 ± 2.88, 20 30.0 - 40.0
Hindfoot length	7.5 ± 1.11, 38 4.0 - 11.0	7.8 ± 1.30, 14 6.0 - 11.0	6.6 ± 0.72, 20 5.7 - 8.0
Ear length	13.8 ± 2.20, 39 7.0 - 19.0	14.1 ± 1.27, 15 12.0 - 16.0	13.0 ± 1.87, 20 10.0 - 15.7
Forearm length	36.4 ± 0.92, 39 34.3 - 38.5	36.9 ± 1.20, 16 35.0 - 39.3	33.7 ± 1.21, 19 32.0 - 36.2
Weight	5.2 ± 0.93, 31 4.0 - 8.0	7.0 ± 1.30, 7 5.0 - 9.0	5.2 ± 1.08, 18 3.8 - 8.0
Condylobasal length	13.4 ± 0.35, 40 12.5 - 14.4	14.0 ± 0.34, 15 13.2 - 14.4	12.7 ± 0.29, 23 12.2 - 13.5
Least interorbital breadth	4.6 ± 0.15, 9 4.4 - 4.8	4.9 ± 0.16, 15 4.7 - 5.2	4.6 ± 0.12, 19 4.4 - 4.8
Zygomatic breadth	8.6 ± 0.23, 26 8.3 - 9.0	9.2 ± 0.13, 6 9.1 - 9.5	8.4 ± 0.22, 10 8.2 - 8.8
Greatest length of skull	14.3 ± 0.29, 40 13.8 - 15.0	14.7 ± 0.27, 15 14.3 - 15.2	13.4 ± 0.31, 23 12.9 - 14.3
Postorbital constriction	3.5 ± 0.10, 40 3.3 - 3.8	3.8 ± 0.11, 15 3.6 - 4.0	3.4 ± 0.12, 23 3.2 - 3.7
Breadth of braincase	6.9 ± 0.25, 40 6.4 - 7.4	7.3 ± 0.30, 15 6.9 - 7.7	6.5 ± 0.23, 23 6.1 - 7.1
Length of maxillary toothrow	5.4 ± 0.17, 39 5.2 - 5.9	5.5 ± 0.15, 15 5.3 - 5.9	5.0 ± 0.13, 23 4.8 - 5.4
Palatal length	7.1 ± 0.31, 32 6.6 - 7.9	7.2 ± 0.21, 14 7.0 - 7.6	6.3 ± 0.22, 19 6.0 - 6.9
Mastoidal breadth	7.2 ± 0.14, 37 6.9 - 7.5	7.6 ± 0.18, 15 7.2 - 7.9	6.9 ± 0.12, 23 6.7 - 7.2
Length of mandibular toothrow	5.8 ± 0.14, 27 5.5 - 6.1	5.9 ± 0.14, 15 5.7 - 6.2	5.3 ± 0.18, 21 5.0 - 5.6
Length of mandible	10.4 ± 0.25, 37 9.8 - 10.8	10.8 ± 0.30, 15 10.2 - 11.2	9.8 ± 0.20, 21 9.4 - 10.1
C-C (width across canines)	3.5 ± 0.10, 36 3.3 - 3.7	3.8 ± 0.13, 14 3.6 - 4.0	3.4 ± 0.12, 19 3.2 - 3.7
M-M (width across molars)	5.6 ± 0.18, 37 5.2 - 6.0	5.9 ± 0.16, 14 5.8 - 6.3	5.3 ± 0.13, 22 5.1 - 5.6

Cacheuta, 2 (1 BMNH, 1 FCM); Cerro de la Gloria, 2 (IADIZA-CM); Lavalle, 1 (IADIZA-CM); Malargue, 4 (MACN); Mendoza, 3 (1 MCZ, 2 USNM); Ñacuñán, 17 (16 IADIZA-CM, 1 OMNH); Reserva Ecológica Ñacuñán, 1 (IADIZA-CM); Reserva Telteca, 1 (OMNH); Uspallata, 4 (MACN). NEUQUÉN: Neuquén, 400 m, 1 (BMNH). SALTA: Buena Vista, 1 (TTU); Cachi, 1 (CML); Campo Santo, 1 (ROM); General Güemes, Ruta 34 km 1363, 2 (1 ROM, 1 TCWC); Guachipas, 1 (MACN); Guachipas, Iglesia, 2 (TCWC); Güemes, 1 (MACN); Hickman, 3 (CML); Horcones, 1 (ROM); La Merced, 2 (TCWC); Rosario de Lerma, Escuela Gurruchaga, 1 (MACN); Salta Capital, 2 (1 TCWC, 1 TTU); San Lorenzo, 1 (TCWC); Santa Victoria Oeste, 2200 m, 2 (MACN); Upper Cachi, 1 (BMNH); Valle de Lerma, 1200 m, 1 (BMNH). SAN JUAN: Ischigualasto, 1 (CML); Las Tumanas, along Hwy 510 at crossing of Río Tumanas, 1 (IADIZA-CM);

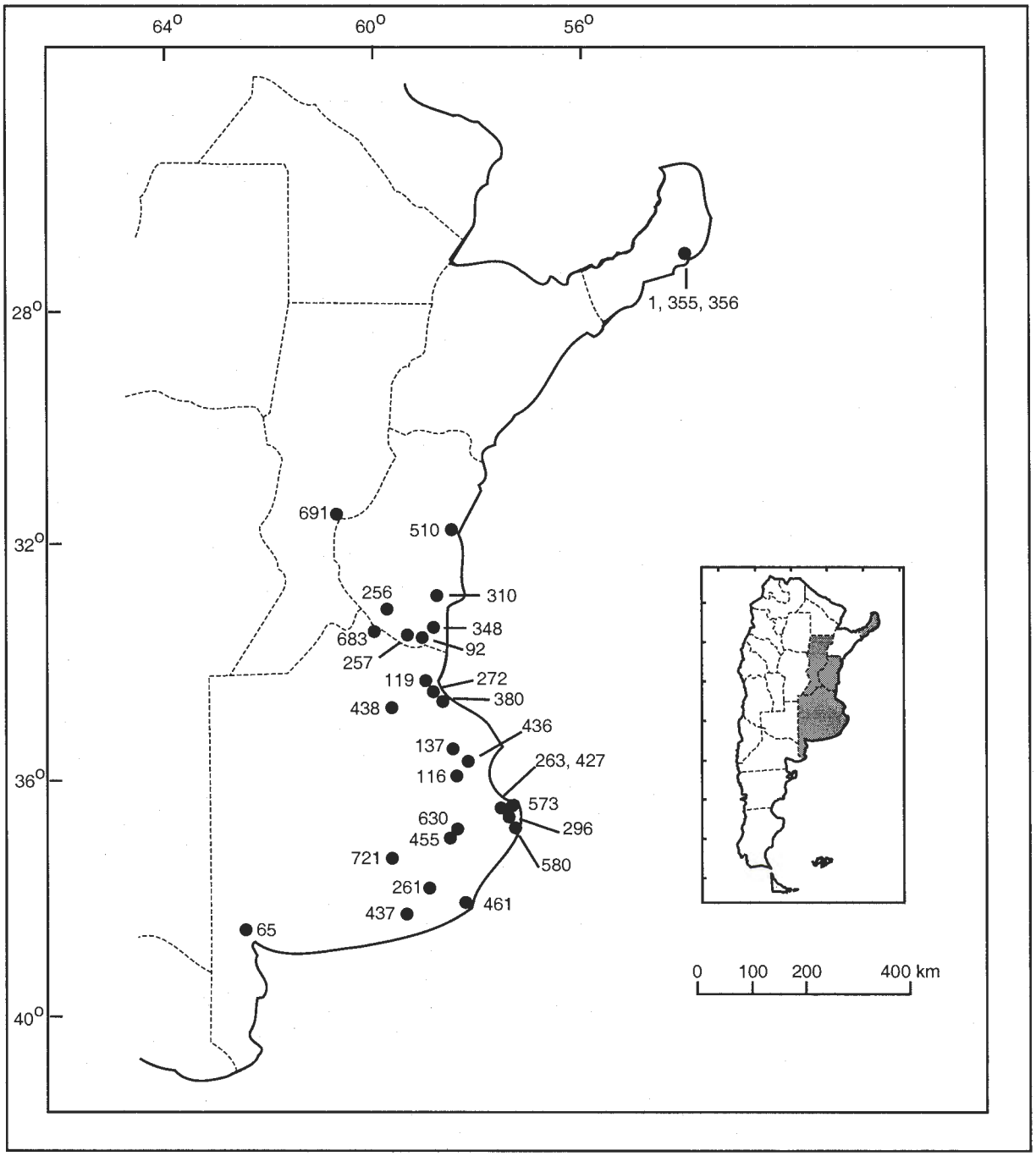


Figure 75. Map of the localities of *Myotis levis levis*.

Pedernal, 1 (OMNH). SAN LUIS: La Toma, 13 (MACN); Naschel, 1 (ROM); Quebrada de López, San Francisco del Monte de Oro, 1 (OMNH); Saladillo, Río Quinto, 1 (MACN); San Luis, 4 (MACN). TUCUMÁN: Agua Rosada, San Pedro de Colalao, 2 (CML); Aguas Chiquitas, 25 km NE San Miguel de Tucumán, 800 m, 5 (CM); Amaicha del Valle, 2000 m, 1 (OMNH); Arroyo El Saltón, Reserva Provincial Santa Ana, 4 (CML); Colalao del Valle, 2500 m, 1 (BMNH); Concepción, 4 (3 BMNH, 1 FMNH); Dique Escaba, 3 (CML); Dique San Ignacio, 1 (CML); Horco Molle, Parque Biológico Sierra de San Javier, 10 (CML); Horco Molle, Residencia Universitaria, 1 (CML); La Ciénaga, 2500 m, 1 (BMNH); La Higuera, 1 (CML); La Rinconada, 1

(CML); Las Pavas, Aconquija, 1 (MACN); Las Talas, 4 km al N de Bella Vista, 3 (SIG); Leocadio Paz, 1 (MACN); Ñorco, Vipos, 2500 m, 2 (BMNH); Parque Provincial El Cochuna, km 40 sobre ruta 47, 1 (CML); Río Pueblo Viejo, Reserva Provincial La Florida, 2 (CML); San Pedro de Colalao, south of, at km marker 42, on Hwy 364, 4,700 ft, 13 (3 CML, 3 IADIZA-CM, 7 OMNH); Tacanas, 1 (CML); Tafí de Valle, 2200 m, 1 (CML); Tucumán, 400 m, 3 (BMNH); Tucumán, 450 m, 2 (MACN); Tucumán, 456 m, 2 (BMNH); Tucumán, no specific locality, 1 (BMNH); Vipos, Estancia San Pedro, 5 (CML).

Additional Records.— BUENOS AIRES: Bahía Blanca (Baud, 1979). CATAMARCA: Las Juntas, 50 km NW Catamarca Ciudad (Mares et al., 1996) (= Las Juntas, Estancia de los Figueroa, 50 km NW Catamarca Ciudad). CÓRDOBA: Espinillo (Tiranti and Torres, 1998); Paso del Durazno (Tiranti and Torres, 1998); Río Cuarto (Tiranti and Torres, 1998); Segunda Usina (Tiranti and Torres, 1998); Villa Walcarde (MVZ, not examined). LA PAMPA: Agua de Torres (Santis and Justo, 1978). MENDOZA: Departamento San Carlos (Roig, 1965); El Challao (Roig, 1965); Mendoza (MVZ, not examined); Puesto Lima (Roig, 1965). SALTA: Cafayate (La Val, 1973; Romaña and Abalos, 1950); Departamento San Carlos (Yepes, 1944); Finca La Rosa, Cafayate, 2000 m (Villa-R. and Villa-C., 1971); La Merced, 1200 m (La Val, 1973); Río Blanco, 35 km SW Salta (Villa-R. and Villa-C., 1971); Salta (La Val, 1973); Termas de Rosario de La Frontera (Romaña and Abalos, 1950). SANTIAGO DEL ESTERO: Ojo de Agua (Romaña and Abalos, 1950).

Myotis levis levis (I. Geoffroy St.- Hilaire)

Vespertilio levis I. Geoffroy St.- Hilaire, Annales des Sciences Naturelles, Paris, ser. 1, 3:444-445, 1824.

Myotis levis levis: La Val, Los Angeles County Museum Natural History Science Bulletin, 15:38, 1973.

Type Locality.—"Southern Brazil."

Distribution in Argentina.— Figure 75.

Measurements.— Table 9.

Specimens Examined (81).— BUENOS AIRES: Bahía Blanca, 1 (MACN); Canal 15, 1 (ROM); Capital Federal, 9 (MACN); Chascomús, 1 (MACN); Delta del Paraná de las Palmas, 1 (TCWC); Estancia El Casalito, Ruta 226 ca. km 98, 3 (MSU); Estancia La Esperanza, 5 (CML); Ezpeleta, 1 (FCM); La Plata, 3 (MLP); Lavalle, 1 (USNM); Libres del Sur, 1 (MACN); Lobería, 15 km SW, 2 (MACN); Lobos, 1 (MACN); Maipú, 1 (TTU); Mar del Plata, 1 (ROM); Punta Rasa, Cabo San Antonio, 1 (OMNH); Rancho Los Yngleses, Ajó, 10 (BMNH); Ruta 2 y puente del Canal 2, 2 (MACN); San Pedro, vuelta de Rocha, 1 (MACN); Tandil, 2 (MACN). ENTRE RÍOS : Brazo Largo, 2 (TTU); Departamento Gualeyguachú, 7 (TCWC); Estación Médanos, 2 (TTU); Estación Paranacito, 2 (FCM); Islas de Ibicuy, Paranacito, 4 (TTU). MISIONES: 6 km NE by Highway 2 of jct. Highway 2 and Arroyo Paraíso, 1 (CML); Jct. Hwy 2 and Arroyo Paraíso, 13 (8 CML, 5 IADIZA-CM); Jct. Hwy 21 and Arroyo Oveja Negra, approx. 2 km W Parque Provincial Moconá, 1 (CML). SANTA FE: Santa Fe, 1 (MFA).

Additional Records.— BUENOS AIRES: General Lavalle, 20 mi S (La Val, 1973). ENTRE RÍOS: Parque Nacional El Palmar (Massoia and Di Lorio, 1981).

Myotis nigricans (Schinz)

Vespertilio nigricans Schinz, Naturgeschichte und Abbildungen der Säugethiere. Das Thierreich eingetheilt nach dem Bau der Thiere als Grundlage ihrer Naturgeschichte und der vergleichenden Anatomie von dem Herrn Ritter von Cuvier. Säugethiere und Vögel. J. G. Cotta'schen Buchhandlung, Stuttgart und Tübingen, 1:179, 1821.

Myotis nigricans: Miller, North American Fauna, 13:74, 1897.

Type Locality.— The type specimen was collected by Wied-Neuwied in Fazenda do Agá, near the Rio Iritiba, Espirito Santo, Brazil. This specimen is apparently lost, as it has not been located in the museums of Europe (Carter and Dolan, 1978), or in the AMNH where a large part of the Wied-Neuwied collection is deposited (La Val, 1973). La Val (1973) designated as a neotype an adult female (Los Angeles County Museum, No. 36877) from 42 km S Rio de Janeiro, Brazil.

Distribution.— This species is widely distributed in South America. The only subspecies known from Argentina is *Myotis n. nigricans* (Schinz), which agrees with Wilson and La Val (1974). It occurs in almost all

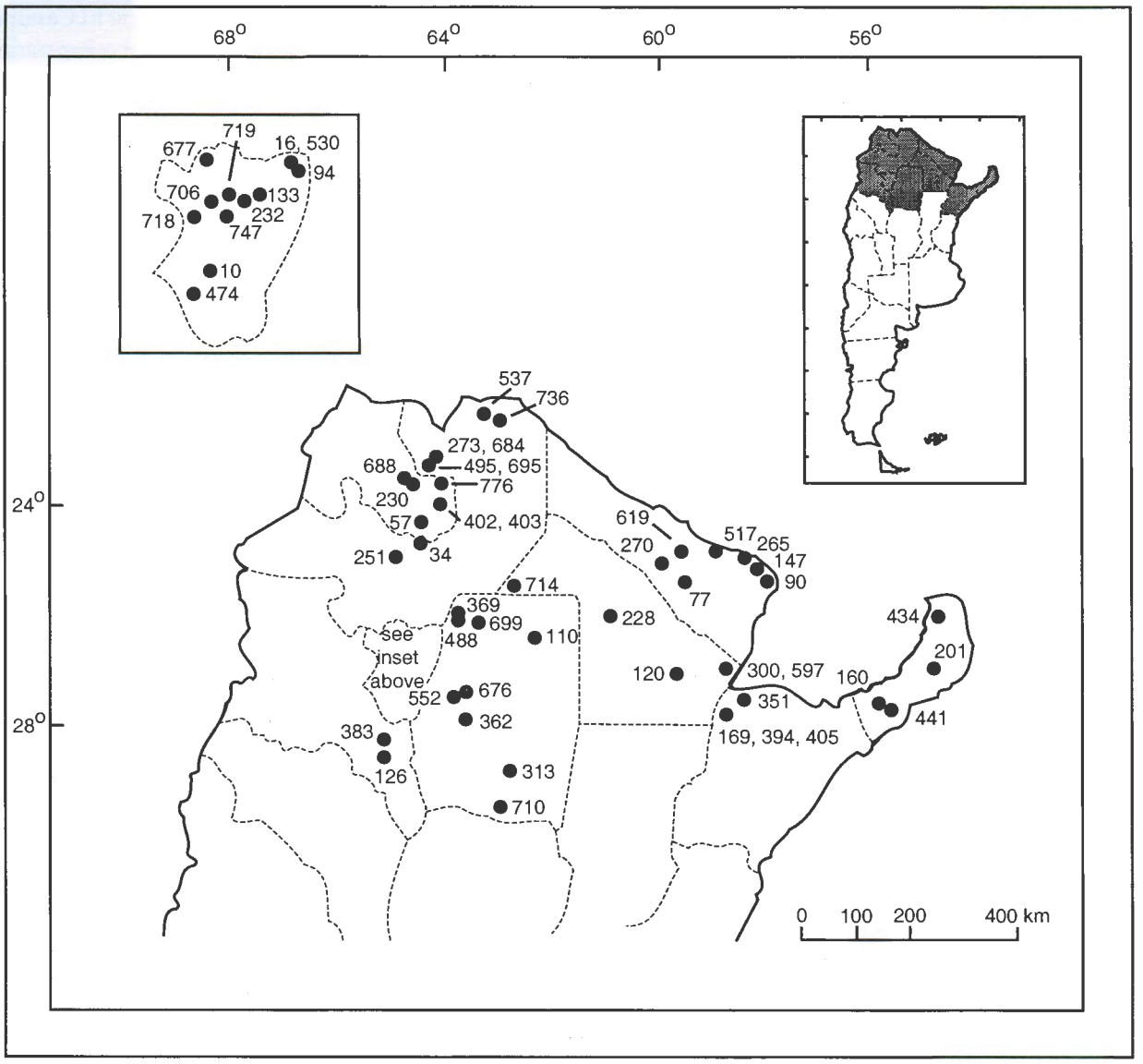


Figure 76. Map of the localities of *Myotis nigricans*.

tropical and subtropical forests up to 3150 m, but is less common above 1200 m. It also is found in savannas and brushy habitats. Two other subspecies are found in South America (La Val, 1973): *M. n. punensis* occurs on the west coast from northern Peru to central Colombia, and *M. n. caucensis* occurs in the Andes of Colombia, Ecuador, and Peru.

Distribution in Argentina (Fig. 76).— Like *M. albescens*, *M. nigricans* is widely distributed, but captures are relatively uncommon. Many specimens in various collections were found to be misidentified or unidentified.

Description (Figs. 77a, 77b, 77f, and 78).— La Val (1973) and Wilson and La Val (1974) described this species, but the following description is based on Argentine specimens. This species is highly variable externally and cranially. Dorsal hairs are generally unicolored. In specimens from Tucumán Province and Departamento Orán, Salta Province, the tips are slightly paler, but not as much so as in *M. levis*; those from Pozo Hondo, Estancia el Guapo, Santiago del Estero, are even paler than other specimens examined. In these, the dorsal coloration is similar to that of the tips of the hairs of *M. levis*, but the marked contrast with the bases is lacking. In specimens from Chaco and Corrientes, the

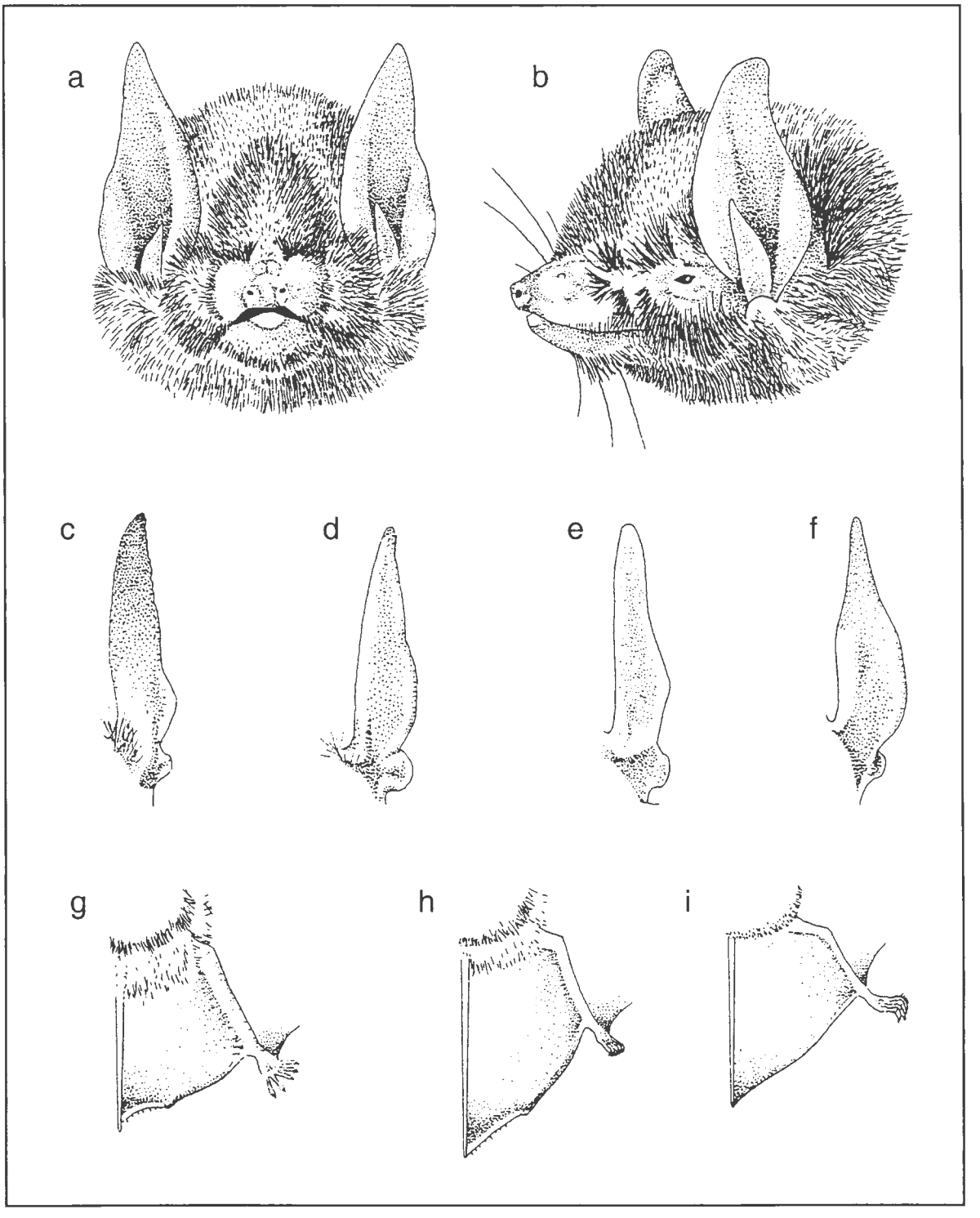


Figure 77. Comparison of characteristics of *Myotis*: (a) frontal view of face of *Myotis nigricans*; (b) lateral view of face of *Myotis nigricans*; (c) tragus of *Myotis ruber*; (d) tragus of *Myotis riparius*; (e) tragus of *Myotis simus*; (f) tragus of *Myotis nigricans*; (g) uropatagium of *Myotis albescens*; (h) uropatagium of *Myotis levis dinellii*; and (i) uropatagium of *Myotis simus*.

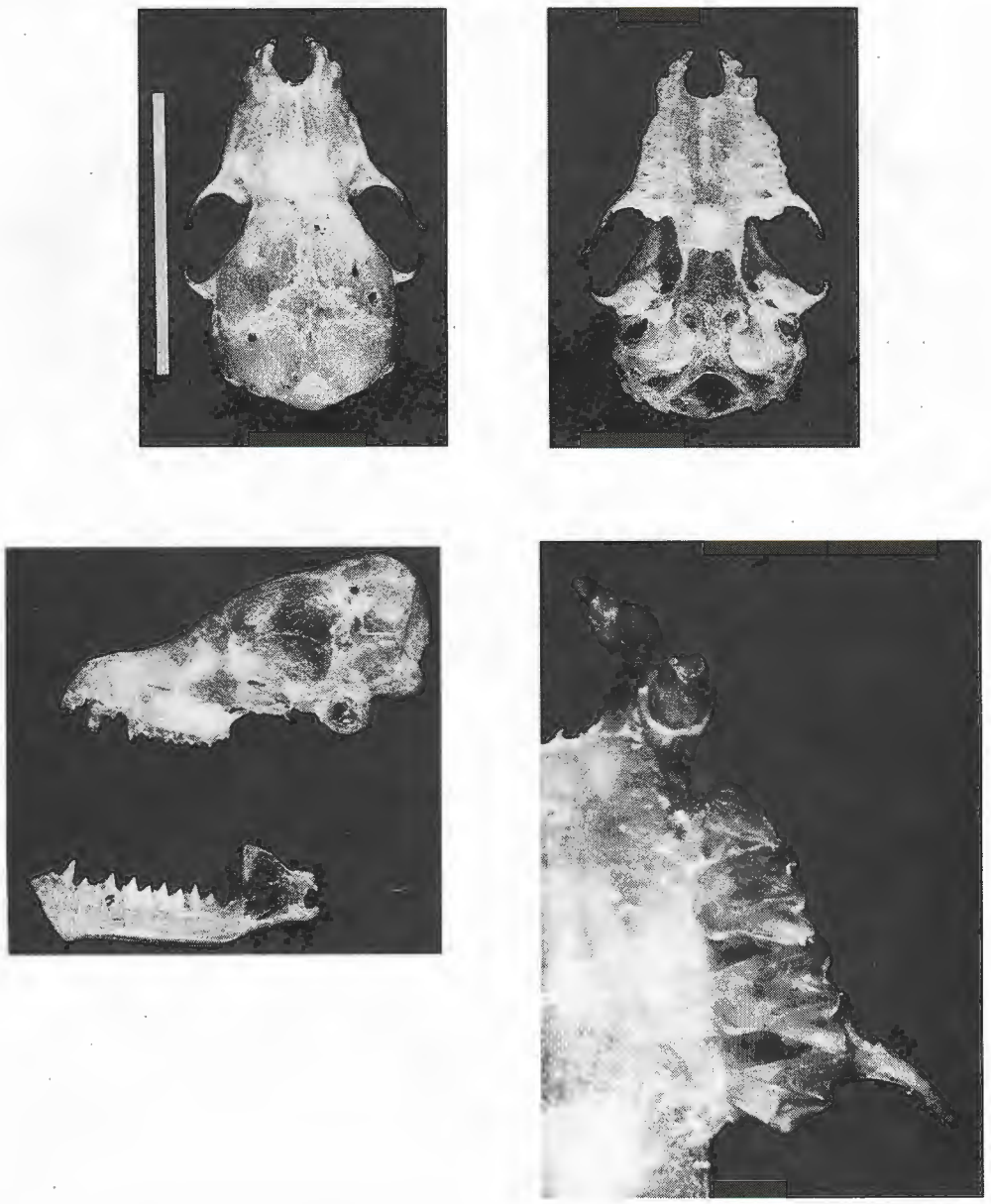


Figure 78. Skull and teeth of *Myotis nigricans*. Adult male from Río Porteño, Formosa Province (OMNH 18889). Bar = 1 cm. Teeth not to scale.

bicoloration of the dorsal hairs is distinct, making them appear similar to *M. riparius* from Misiones and to some atypical specimens of *M. albescens*. Ventrally the hairs are bicolored, with the bases dark brown or black and the tips paler (varying between yellow, cream, or whitish). The membranes are dark, almost black, and practically naked.

The skull is small, the rostrum short, and the sagittal crest normally absent, although it may be present in atypical specimens. The presence of a sagittal crest and a P2 displaced to the lingual side of the toothrow are characteristics of *M. riparius*. These characters normally are not found in *M. nigricans*, although both species can be confused externally.

Apparently much geographic and individual variation exists. La Val (1973) indicated that intraspecific variation is more pronounced in length measures, in ratios involving measurements of skull width and shape, and in color of the pelage.

Measurements.— Table 9.

Comments.— This is a well-studied Neotropical species, yet information on its taxonomy and biology in central and southern South America is incomplete and confused. Specimens from Argentina suggest a variable species with numerous races, but insufficient material is available for statistical analyses. Wilson (1971) studied this species on Barro Colorado Island, Panama, and other studies have also examined its biology (Ibáñez Ulargui, 1981; Mares and Wilson, 1971; Myers, 1977; Willig, 1983; Wilson and Findley, 1970, 1971), but none refer to Argentina.

This species is most common in areas modified by people, but it also occurs in forests. We have collected them from roofs of rural dwellings, below bridges (see comments about *G. soricina*), and beneath tree bark in Piquirenda Viejo, Salta. J. R. Contreras (personal communication) captured specimens from Capitán Solari, La Forestal, Chaco, underneath roofs of rural sheds constructed of palm trunks.

Wilson and Findley (1970) found that the gestation period lasts about 60 days (this is apparently is related to food availability) and weaning occurs about the second or third week. Males become sexually active after 15 to 17 weeks. In the forests of Salta, we found reproductively inactive males in August and active ones in November.

Specimens Examined (107).— CHACO: Capitán Solari, La Forestal, 2 (OMNH); El Mangrullo, 20 km NNW by road and 11 km NE by road, 5 (2 CML, 2 IADIZA-CM, 1 OMNH); General Vedia, 1 (TTU); Northern Chaco, 1 (BMNH); Río de Oro, General Vedia, 3 (FCM); Taco Pozo, 77 km NE, sobre picada 20, 1 (CML). CORRIENTES: Corrientes, 1 (CML); Itatí, 1 (BMNH); Laguna Brava, 2 (OMNH); Laguna Paiva, B° Las Lomas, 16 (CML). FORMOSA: Bouvier, 2 (TTU); Clorinda, 1 (MACN); Estancia Las Mercedes, 1 (TTU); Estanislao del Campo, 2 (1 ROM, 1 TTU); Río Porteño, 5 km S Estancia Santa Catalina, 1 (OMNH). JUJUY: Laguna La Brea, 1 (CML); Laguna La Brea, 25 km W Palma Sola, 4 (2 CML, 2 OMNH); Santa Bárbara, 1 (AMNH). MISIONES: Colonia Mártires, Puerto Candelaria, 1 (MACN); Libertad, 3 (MACN). SALTA: Algarrobal, 20 km E General Güemes, 1 (OMNH); Escuela Gurruchaga, Rosario de Lerma, 1 (TTU); Finca Abra Grande, 1 (OMNH); Orán, 15 km S, 15 km W, along Río Santa María, 1 (CM); Piquirenda Viejo, 6 km W, 2 (1 CML, 1 OMNH); San Ramón de la Nueva Orán, 2 (CML); Santa María, sobre Río Santa María, 1 (CML); Tonono, 1 km E sobre Río Itiyuro, 1 (CML). SANTIAGO DEL ESTERO: Nueva Esperanza, 15 (8 MACN, 1 TCWC, 6 TTU); Pozo Hondo, Estancia El Guapo, 2 (CML); San Pedro, 1 (TTU); Santo Domingo, 21 (5 CML, 6 IADIZA-CM, 10 OMNH). TUCUMÁN: Acheral, 1 (CML); Agua Colorada, 1 (TTU); Cerro del Campo, 900 m, 1 (CML); El Cadillal, 25 km N San Miguel de Tucumán, 1 (CM); El Naranjo, 1 (TTU); Piedra Tendida, 12 km WNW Burruyacú along Río Cajón, 2,500 ft., 1 (OMNH); Senda del Pluviómetro, 800 m, Horco Molle, 1 (CML); Tafí Viejo, 1 (CML).

Additional Records.—CATAMARCA: Catamarca, Ciudad (Romaña and Abalos, 1950); La Puerta (Romaña and Abalos, 1950). FORMOSA: Bartolomé de Las Casas (Massoia, 1970); Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.). JUJUY: Arroyo La Urbana, 45 km E y 5.4 km SE San Salvador de Jujuy, 620 m (La Val, 1973); El Monolito (Olrog, 1979); Yuto (Olrog, 1959). MISIONES: Departamento Cainguás (Massoia, 1980); Departamento Capital (Massoia, 1980); Dos de Mayo, Paraje km 51 (Massoia and Chebez, 1989); Los Helechos, Escuela n° 12 (Massoia et al., 1990). SANTIAGO DEL ESTERO: Campo Gallo (Romaña and Abalos, 1950); El Zanjón (Romaña and Abalos, 1950); Herrera (Romaña and Abalos, 1950); La Banda (Romaña and Abalos, 1950); La Fragua (Romaña and Abalos, 1950); Pozo Hondo, Estancia El Guapo (La Val, 1973); Sumampa (Romaña and Abalos, 1950). TUCUMÁN: Burruyacú (Romaña and Abalos, 1950); Monte Bello (Romaña and Abalos, 1950); San Pedro de Colalao (Romaña and Abalos, 1950); Tafí del Valle (Romaña and Abalos, 1950); Tucumán, ciudad (Romaña and Abalos, 1950).

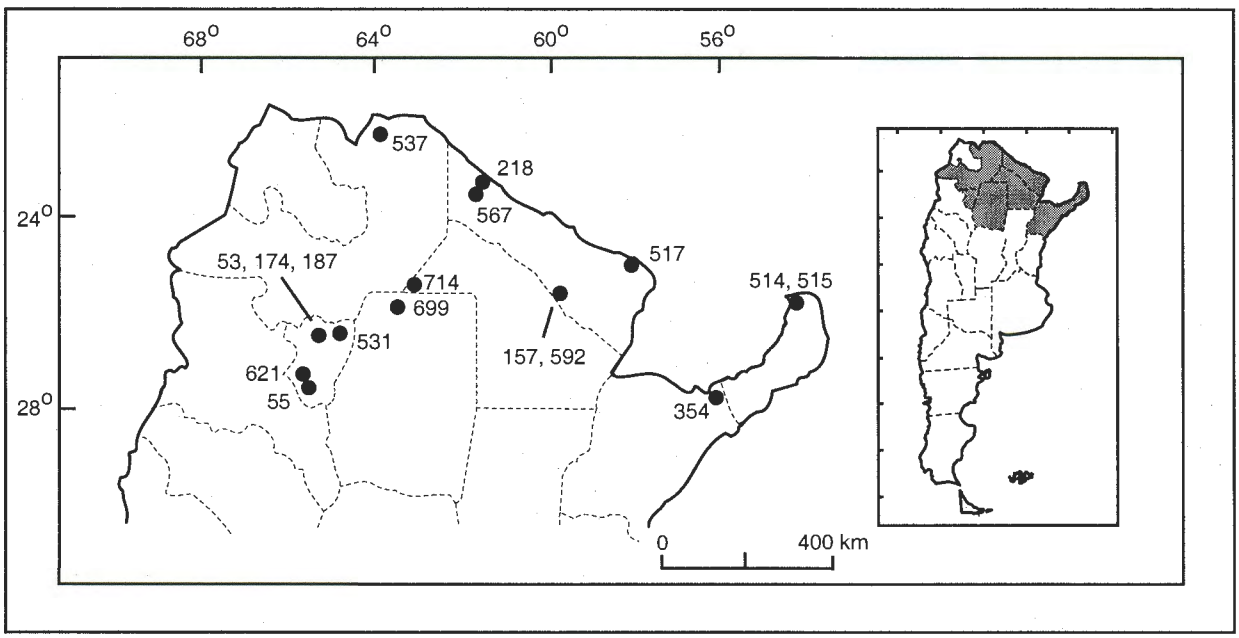


Figure 79. Map of the localities of *Myotis riparius*.

Myotis riparius Handley

Myotis simus riparius Handley, Proceedings of the United States National Museum, 112:466-468, 1960.

Myotis riparius: La Val, Los Angeles County Museum of Natural History Science Bulletin, 15:32-33, 1973.

Type Locality.— Panama, Darien, Villa Tacarcuna, Río Pucro, 975 m. We have not modified the specific name to agree in gender with the generic name (Woodman, 1993).

Distribution.— According to La Val (1973) and Koopman (1993), the distribution includes most of South America, except western Peru, southwestern Bolivia, Chile, and most of Argentina.

Distribution in Argentina.— Figure 79.

Description (Figs. 77d and 80).— Specimens from Argentina are similar to *M. nigricans* from Chaco and Corrientes. In contrast to *M. nigricans*, *M. riparius* has a sagittal crest and the P2 is displaced to the lingual side of the toothrow. A specimen from Uruguay, 40 km NW Tacuarembo (CML) is similar to those from Misiones, although the pelage is redder. Argentine specimens are cinnamon brown dorsally, and the base of the hair is darker. The tips of many of the hairs are bright yellow, giving a frosted appearance, although this is less pronounced than in *M. albescens*. La Val (1973) reported that color varies from dark gray to bright cinnamon. Ventral hairs are bicolored, with the hairs dark brown to black basally and the tips pale, cream, or yellowish. Wing membranes join the body at the base of the phalanges. Ears are small, narrow, and the tips rounded; the internal margin is straight; the tragus is straight to the distal one-half and then widens, becoming convex in the basal one-half, where it terminates in a small lobe. The calcar is well developed, extending about one-half the distance between the tip of the tail and the foot; tibia are long.

The skull is similar to other *Myotis*, differing by the presence of a low sagittal crest and by the small P2 that is displaced to the lingual side of the toothrow. Because of this arrangement, the P2 is not visible in lateral view, a trait that also is found in *M. simus*. *M. riparius* from Argentina can only be confused (externally) with some *M. nigricans*, and with some *M. ruber* that are not bright red, although *M. ruber* is larger.

Measurements.— Table 10.

Comments.— The biology of this species is poorly known and no data are available for Argentina. Brosset and Charles-Dominique (1990) found this species to be rare in French Guiana, but reported it as widespread in

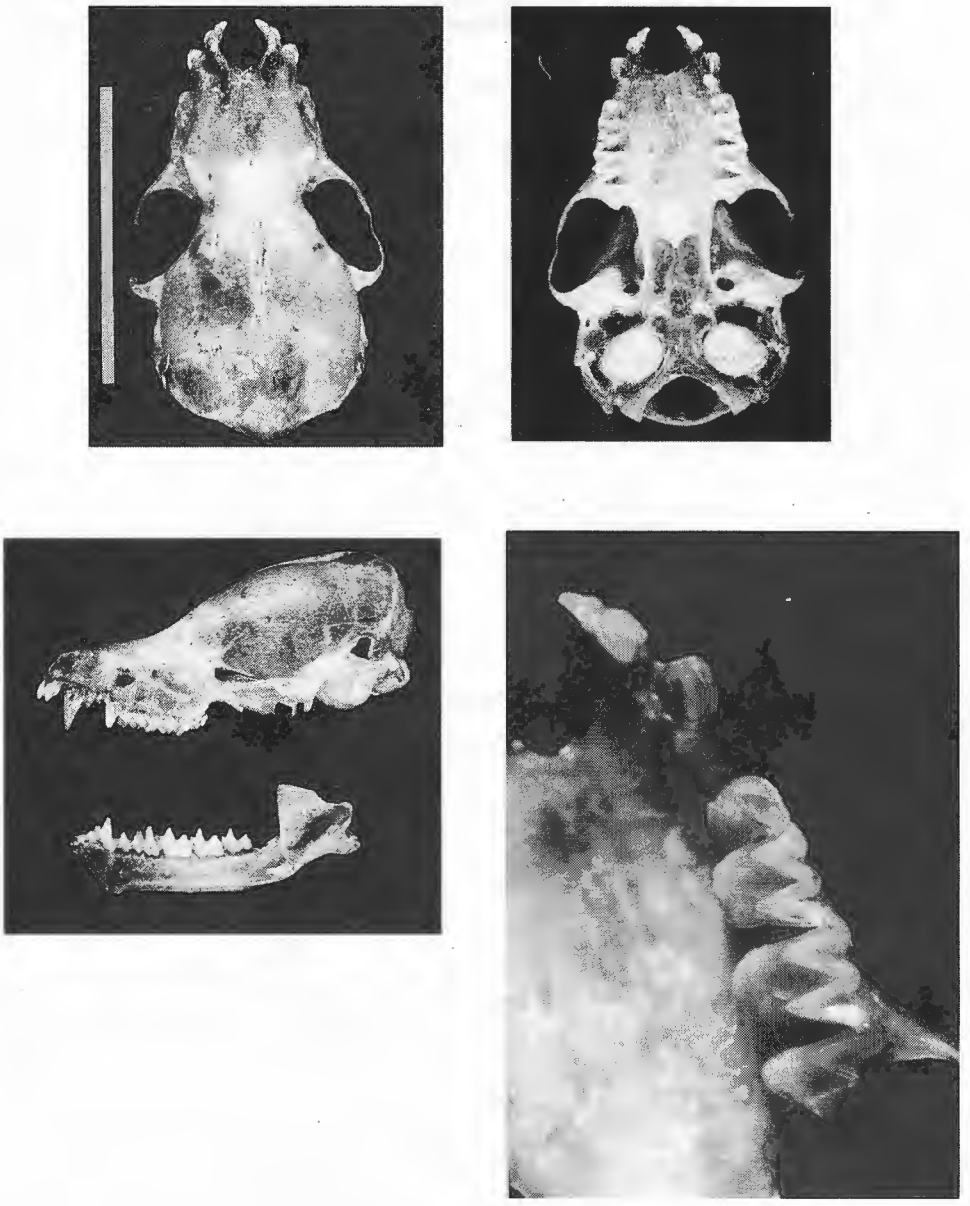


Figure 80. Skull and teeth of *Myotis riparius*. Adult male from Tacuarembo, Uruguay (CML). Bar = 1 cm. Teeth not to scale.

the Amazon rain forest. La Val (1973) noted that this species exhibits little geographic variation over its range. Barquez and Ojeda (1992) found a pregnant female (one fetus = 5 mm CRL) under the bark of a quebracho (*Schinopsis*) tree in Colonia km 503, 16 km S, Formosa Province. Specimens collected at Santo Domingo, Santiago del Estero Province, were living under the roof of a dwelling in the small town in colonies of about 50 individuals. Other species also roosting under the roof were *M. nigricans*, *M. albescens*, and *Molossus molossus*.

Specimens Examined (30).— CHACO: Taco Pozo, 77 km NE, sobre picada 20, 4 (2 CML, 2 IADIZA-CM). CORRIENTES: Ituzaingó, 25 km E, 1 (AMNH). FORMOSA: Colonia km 503, 16 km S, 2 (1 CML, 1 IADIZA-CM); Puesto Divisadero, 35 km S, 5 km E Ing. Guillermo N. Juárez, 1 (CML); Río Bermejo, 10

Table 10. Measurements of Myotis riparius, Myotis ruber, *and* Myotis simus. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Myotis riparia*	*Myotis ruber*	*Myotis sima*
Total length	44.4 ± 2.62, 3 42.0 - 47.2	87.2 ± 2.55, 2 85.4 - 89.0	95.0, 1
Tail length	32.6 ± 3.86, 3 28.2 - 35.4	37.2 ± 1.70, 2 36.0 - 38.4	40.0, 1
Hindfoot length	6.9, 1	7.1 ± 1.56, 2 6.0 - 8.2	8.0, 1
Ear length	10.7 ± 1.79, 3 8.6 - 11.7	14.3 ± 1.84, 2 13.0 - 15.6	12.0, 1
Forearm length	35.1 ± 0.90, 3 34.2 - 36.0	38.4 ± 0.92, 2 37.7 - 39.0	41.0, 1
Weight	5.9 ± 0.10, 3 5.8 - 6.0	6.8 ± 1.13, 2 6.0 - 7.6	
Condylobasal length	4.6, 1	14.1 ± 0.00, 2 14.1 - 14.1	13.7, 1
Least interorbital breadth		4.9 ± 0.14, 2 4.8 - 5.0	5.5, 1
Zygomatic breadth		9.4 ± 0.14, 2 9.3 - 9.5	9.4, 1
Greatest length of skull	13.7, 1	14.7 ± 0.00,2 14.7 - 14.7	14.2, 1
Postorbital constriction	3.4, 1	3.7 ± 0.00, 2 3.7 - 3.7	4.2, 1
Breadth of braincase		7.2 ± 0.21, 2 7.0 - 7.3	7.9, 1
Length of maxillary toothrow	5.2, 1	5.8 ± 0.21, 2 5.6 - 5.9	5.3, 1
Palatal length		6.9 ± 0.07, 2 6.8 - 6.9	5.4, 1
Mastoidal breadth		7.8 ± 0.7, 2 7.7 - 7.8	8.1, 1
Length of mandibular toothrow	5.3, 1	6.4 ± 0.07, 2 6.3 - 6.4	5.6, 1
Length of mandible	10.0, 1	11.4 ± 0.14, 2 11.3 - 11.5	11.1, 1
C-C (width across canines)	3.7, 1	4.3 ± 0.21, 2 4.2 - 4.3	4.1, 1
M-M (width across molars)	5.5, 1	6.0 ± 0.21, 2 5.8 - 6.1	6.0, 1

mi S Colonia km 503, 1 (CML). MISIONES: Parque Nacional Iguazú, cataratas, 2 (OMNH); Parque Nacional Iguazú, ex aeropuerto, 2 (CML). SALTA: Piquirenda Viejo, 6 km W, 1 (CML). SANTIAGO DEL ESTERO: Santo Domingo, 10 (CML). TUCUMÁN: Arroyo Aguas Chiquitas, Reserva Provincial Aguas Chiquitas, 1 (CML); Arroyo El Saltón, Reserva Provincial Santa Ana, 1 (CML); Cuesta del 25, 3 km N entrada al Dique El Cadillal, 1 (CML); Dique El Cadillal, 25 km N San Miguel de Tucumán, 1 (CM); Piedra Tendida, 5 km W de Dique El Cajón, 1 (CML); Río Pueblo Viejo, Reserva Provincial La Florida, 1 (CML).

Additional Records.— FORMOSA: Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.).

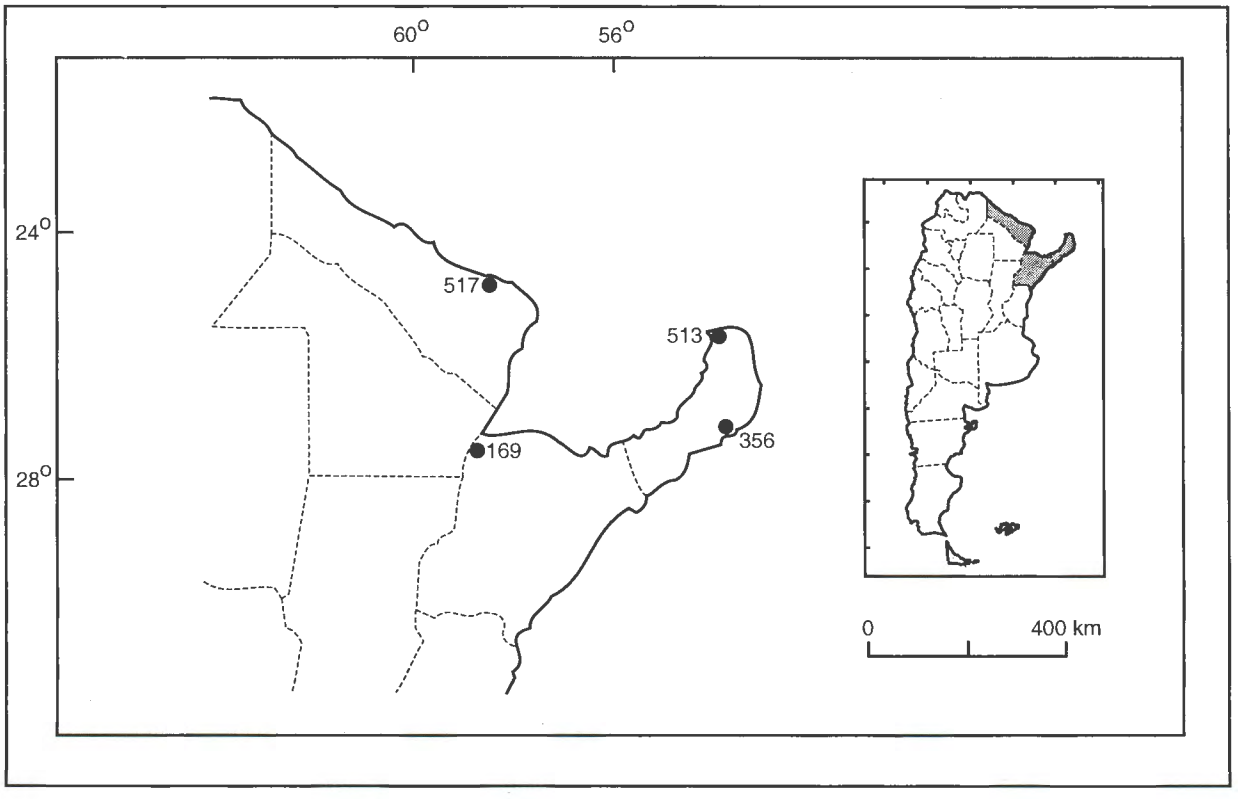


Figure 81. Map of the localities of *Myotis ruber*.

Myotis ruber (É. Geoffroy St.- Hilaire)

Vespertilio ruber É. Geoffroy St.- Hilaire, Annales du Muséum d'Histoire Naturelle, Paris, 8:204, 1806.

Myotis ruber: Thomas, Annals and Magazine of Natural History, ser. 7, 10:493, 1902.

Type Locality.— Restricted to Asunción, Paraguay, by Miller and Allen (1928). The type apparently was based on one of the bats of Azara (Chave-souris onzieme). The type specimen has not been found in European museums and apparently is lost. La Val (1973) designated an adult male (USNM 115097) from de Sapucay, Paraguay, 300 m, as the neotype.

Distribution.— This species is known only from southern Brazil, southern Paraguay, and northeastern Argentina.

Distribution in Argentina (Fig. 81).— This is a rare species. Cabrera (1930) included it in Corrientes Province assuming that d'Orbigny obtained a specimen from that locality with the precise location supposedly given in his Atlas Zoologie (d'Orbigny, 1836). Cabrera (1958) included it in Misiones and Corrientes, but only as a synonym of *M. levis*. *M. ruber* was erroneously listed for the province of Tucumán by Lucero (1983).

Description (Figs. 77c and 82).— Size is large for the genus; forearm lengths for specimens from Misiones Province are 37.7 and 39 mm. Dorsal coloration is bright red, the hairs essentially unicolored (slightly darker at the base); the venter is paler (reddish yellow) with the bases of the hairs dark brown, making a strong contrast between the bases and tips. Membranes and ears are dark, almost black. Some specimens of *M. simus* resemble *M. ruber*, but the pelage of *M. simus* is much shorter, does not extend over the uropatagium, and the membrane is attached to the body at the ankle (in *M. ruber* it attaches to the body at the first phalanx of the foot). Ears are wide and long, larger than in *M. simus* and with wider and rounded tips. The tragus has a basal lobe. La Val (1973) noted that some specimens of *M. riparius* could be confused with this species, but *ruber* is larger. The most distinctive characteristics are the well-developed sagittal crest and the size of the skull.

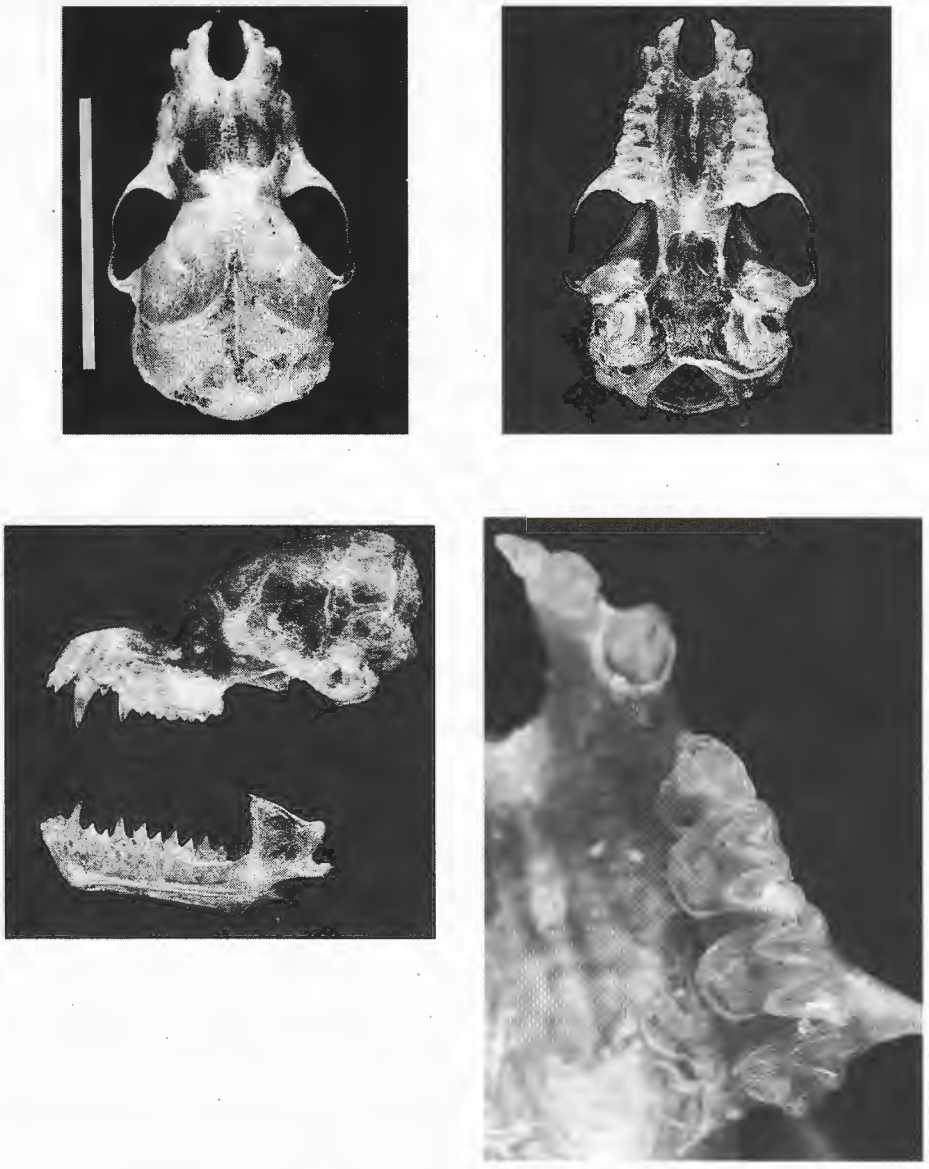


Figure 82. Skull and teeth of *Myotis ruber*. Adult male from Parque Nacional Iguazú, Misiones Province (OMNH 18882). Bar = 1 cm. Teeth not to scale.

Measurements.— Table 10.

Comments.— Biology and ecology essentially unknown. Mares et al. (1995) captured an adult male with small scrotal testes in December in Misiones Province, jct. Hwy 21 and Arroyo Oveja Negra, approx. 2 km W Parque Provincial Moconá, in a mature wet forest. The *M. ruber* was captured along with *Artibeus lituratus*, *Vampyressa pusilla*, and *Myotis levis*.

Specimens Examined (3).— MISIONES: Jct. Hwy 21 and Arroyo Oveja Negra, approx. 2 km W Parque Provincial Moconá, 1 (CML); Parque Nacional Iguazú, 2 (1 MACN, 1 OMNH).

Additional Records.— CORRIENTES: Corrientes (Cabrera, 1958). FORMOSA: Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.). MISIONES: Misiones (no specific locality; Cabrera, 1958).

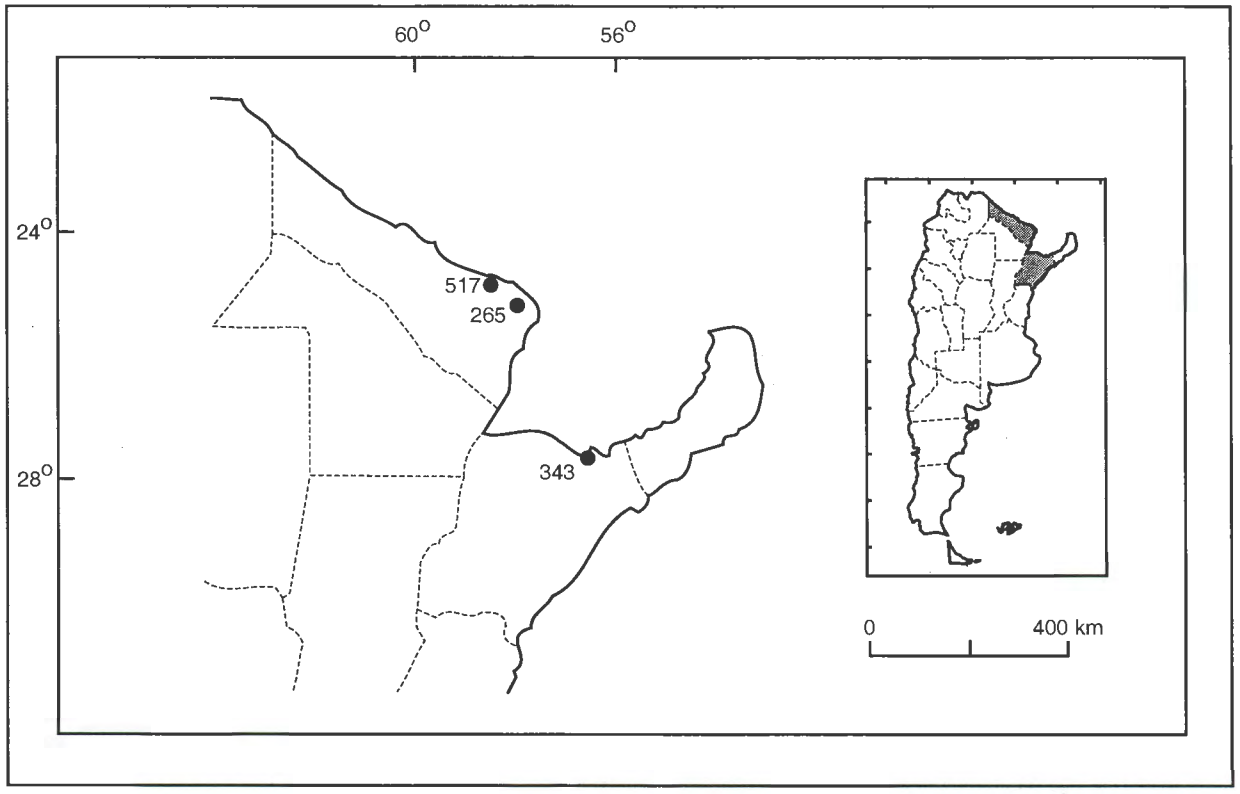


Figure 83. Map of the localities of *Myotis simus*.

Myotis simus Thomas

Myotis simus Thomas, Annals and Magazine of Natural History, ser. 7, 7:541, 1901.

Type Locality.— Perú, Loreto, Saracayu, Río Ucayali. We have not modified the specific name to agree in gender with the generic name (Woodman, 1993).

Distribution.— This species is restricted to the rain forests of the Amazon basin in Peru, Ecuador, southern Colombia, and Brazil (La Val, 1973). Myers and Wetzel (1979) included it in Paraguay and Anderson et al. (1982) reported it for Bolivia.

Distribution in Argentina.— Figure 83.

Description (Figs. 77e, 77i, and 84).— This is one of the most easily identifiable species in Argentina. The short pelage (slightly longer on the venter) gives the appearance of felt. Color is strongly ochraceous, yellowish, or orange, generally yellower on the venter. Membranes are naked and the pelage does not extend over the uropatagium. Ears are small and narrow, with the upper one-half of the external margin of the ear slightly concave and the lower one-half convex; the tragus is well developed, about 5 mm long, and slightly wider at the base.

The skull is robust, the braincase globose, and the sagittal crest developed. The P2 is displaced to the lingual side of the toothrow, a trait shared with *M. riparius*.

Measurements.— Table 10.

Comments.— The biology is almost unknown. Fornes (1972*b*) captured it in mist nets along with *Desmodus rotundus*, *Sturnira lilium*, *Dasypterus ega*, *Noctilio leporinus*, and *Eptesicus* sp. The Formosa specimen was a subadult female captured 25 April; an adult male from Corrientes was captured 2 September. In Peru it has been reported from altitudes below 600 m (Koopman, 1978). Myers and Wetzel (1979) captured it in Paraguay roosting with *N. albiventris* in a hollow quebracho tree (*Aspidospermum*); they also noted that females were pregnant in October, each with one embryo. In eastern Paraguay, Myers and Wetzel (1983) collected this species in chacoan vegetation.

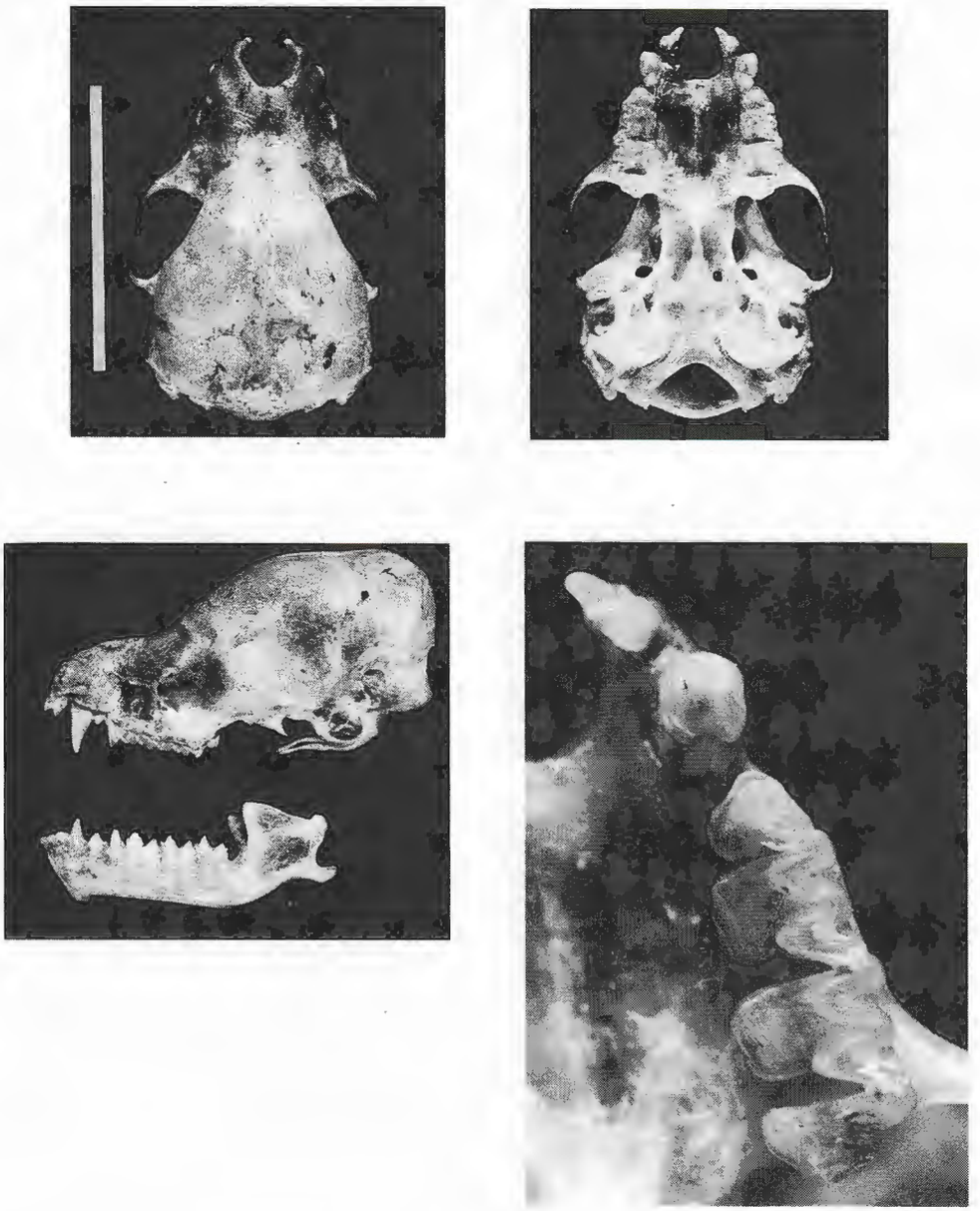


Figure 84. Skull and teeth of *Myotis simus*. Adult female from Beni, Bolivia (CML). Bar = 1 cm. Teeth not to scale.

Specimens Examined (1).— CORRIENTES: Isla Apipé, 1 (MACN).

Additional Records.— FORMOSA: Estancia Las Mercedes (Fornes, 1972*b*); Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.).

Genus *Eptesicus*

This genus, which is almost worldwide in distribution, contains about 33 species. Five species are known from South America and three occur in Argentina. It is similar to *Myotis*, but larger (except *E. diminutus*). Two characters are useful for field identification: the absence of hair from the base of the uropatagium, and the blunt tragus. The tragus is pointed in *Myotis*. The snout of *Eptesicus* is more swollen than that of *Myotis*; I1 and I2 are unequal in size, and only P1 is present. In *Myotis*, the incisors are almost equal in size and three upper premolars are present. The distance between the canine and the first molar is greater in *Myotis* than in *Eptesicus*, in which this space is reduced.

The dental formula is I 2/3, C 1/1, P 1/2, M 3/3, total 32. The dental formula, while differing from *Myotis* (which has 38 teeth), is like *Histiotus*. It cannot be confused with Histiotus, however, because of external and cranial characters. The skulls of the three Argentine species of *Eptesicus* are very similar, differing mainly in size and in the development of the sagittal crest.

Davis (1966) and Williams (1978) reviewed the South American species of *Eptesicus*, and Myers et al. (1983) suggest that all three species are sympatric in the Río Paraná drainage basin. They can be distinguished by size, although overlap may exist: *E. brasiliensis* is large; *E. furinalis* is medium-sized; and *E. diminutus* is small. Misidentifications are likely due to variation in characters such as color and size, and because of sexual dimorphism. Small males of *E. furinalis* can be confused with large females of *E. diminutus*, and large females of *E. furinalis* can be confused with small males of *E. brasiliensis*.

Williams (1978) found that the best characters for species discrimination are the length of the mandible (measured from the external face of the incisors to the posterior point of the angular process) and the length of the mandibular toothrow (measured from the alveolus of the canine to that of the last molar). When these measurements are plotted, there is little overlap between species. However, many of the specimens examined are difficult to identify because their characteristics are intermediate between one species and another, especially between *E. furinalis* and *E. brasiliensis*.

Villa-R. and Villa-C. (1969) identified specimens from Jujuy Province as *E. innoxius* using the key of Davis (1965). Later, Villa-R. and Villa-C. (1971) reidentified them as *E. f. furinalis*, following Davis (1966). Greenhall et al. (1983*b*) considered these specimens and those inhabiting the arid and semiarid areas from Jujuy to Mendoza as *E. innoxius*, including a specimen from Ñacuñan studied by Massoia (1976). However, we believe these specimens are *E. furinalis*.

Eptesicus brasiliensis (Desmarest)

Vespertilio brasiliensis Desmarest, Nouveau dictionnaire d'histoire naturelle, appliquèe aux art, principalement à l'agriculture, et à l'economie rurale et domestique; par une société de naturalistes. Nouvelle edition, presqú entierement refondue et considerablement augmentee. Ch. Deterville, Paris, 35:478, 1819.

Eptesicus brasiliensis: Thomas, Annals and Magazine of Natural Hisory, ser. 9, 5:367, 1920

Type Locality.— Brazil, Goias.

Distribution.— Four subspecies are found in South America: *E. b. melanopterus* in most of the Amazon basin, the Guianas, and Venezuela; *E. b. thomasi* in the western Amazon basin of Brazil, Peru, and Ecuador; *E. b. brasiliensis* in eastern Brazil; and *E. b. argentinus* in southern Brazil, Paraguay, Uruguay, eastern Argentina, and extreme eastern Bolivia. *E. b. argentinus* is the only one found in Argentina. The general distribution given above is that of Davis (1966), although he cites no Bolivian records and later studies do not mention it in Bolivia (Anderson, 1997; Anderson et al., 1982; Anderson and Webster, 1983). Its seems to be rare in Paraguay and was not cited for the country by Myers and Wetzel (1983), although Myers et al. (1983) recorded its presence. The distribution of this subspecies given by Davis (1966) appears exaggerated considering the few data that are available and errors that occurred in listing localities (below).

Eptesicus brasiliensis argentinus Thomas

Eptesicus argentinus Thomas, Annals and Magazine of Natural History, ser. 9, 4:365, 1920.

Eptesicus brasiliensis argentinus: Cabrera, Revista del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," e Instituto Nacional de Investigación de las Ciencias Naturales, Ciencias Zoológicas, 4:105, 1958.

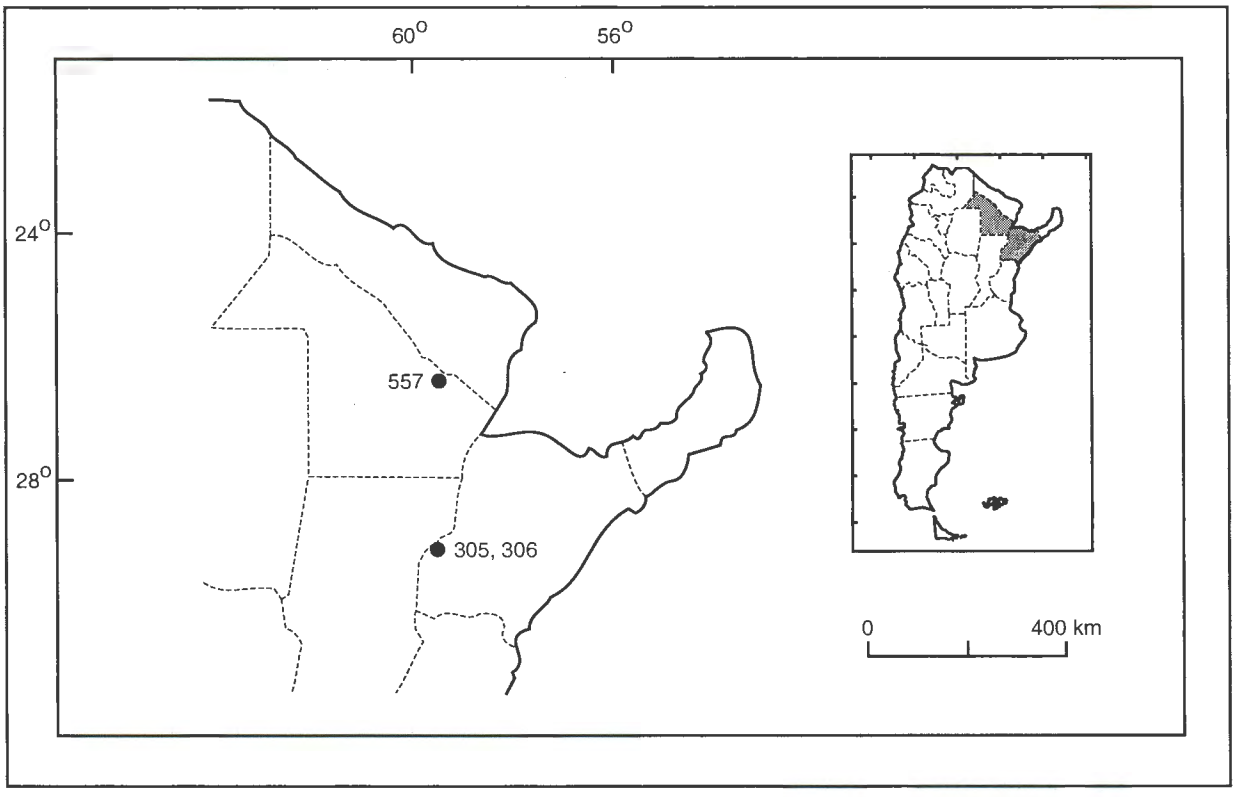


Figure 85. Map of the localities of *Eptesicus brasiliensis argentinus*.

Type Locality.— Argentina, Corrientes, Goya.

Distribution in Argentina (Fig. 85).— After comparing specimens with the type at the BMNH, only the type series and specimens from Puente sobre el Río Bermejo, Chaco (Massoia, 1976) can be assigned to this subspecies. The collection of skins at BMNH contains eight specimens identified as *E. argentinus* (probably by Thomas): seven belong to the type series. Of these, four are males (a paratype) and three are females (two paratypes). Two of the males are relatively young with a felt-like pelage, cartilaginous phalanges, and forearm lengths of 36.0 and 36.5 mm. The other specimen is a male from Cruz del Eje, Córdoba, identified on the tag as *Eptesicus* cf. *argentinus* which is *E. furinalis*. Other specimens such as a male from Yuto, Jujuy (BMNH) mentioned by Thomas (1920*b*) as *E. hilarei*, a female from La Maya, Córdoba (MVZ), probably those mentioned by Massoia (1976) for Ñacuñan (CEM), Mendoza, and those (MSB) from Potrero River Dike, Catamarca (Williams, 1978) are here treated as *E. furinalis*. Specimens examined from these last localities are individuals with measurements at the upper range of the measurements of *E. furinalis*. Specimens in the CML collection from Huyamampa, Santiago del Estero and San Antonio de la Falda, Catamarca (Olrog, 1959) also pertain to this species. There is an apparent error in Davis (1966) in the placement of the localities for *E. b. argentinus*; only two localities in Corrientes Province (Goya and Concepción) are mentioned, but the latter is placed in Tucumán Province. The locality name "Concepción" exists for towns in both Corrientes and Tucumán. We were unable to find specimens of *E. b. argentinus* from either location at the BMNH where specimens of *E. furinalis* from Concepción, Tucumán, were examined (and were identified by Davis in 1965). Specimens from Gualeguaychú, Entre Ríos, in the TCWC, TTU, and ROM collections are *E. furinalis*; some are the same specimens cited by Fornes and Massoia (1967) as *E. brasiliensis*.

Description (Figs. 86g).— Size is large for Argentine *Eptesicus*, with the length of the forearm > 41 mm in adults, greatest length of skull > 16.7, and zygomatic breadth > 12.0 mm. The dorsal coloration is light brown, with the bases of the hairs darker. Some speci-

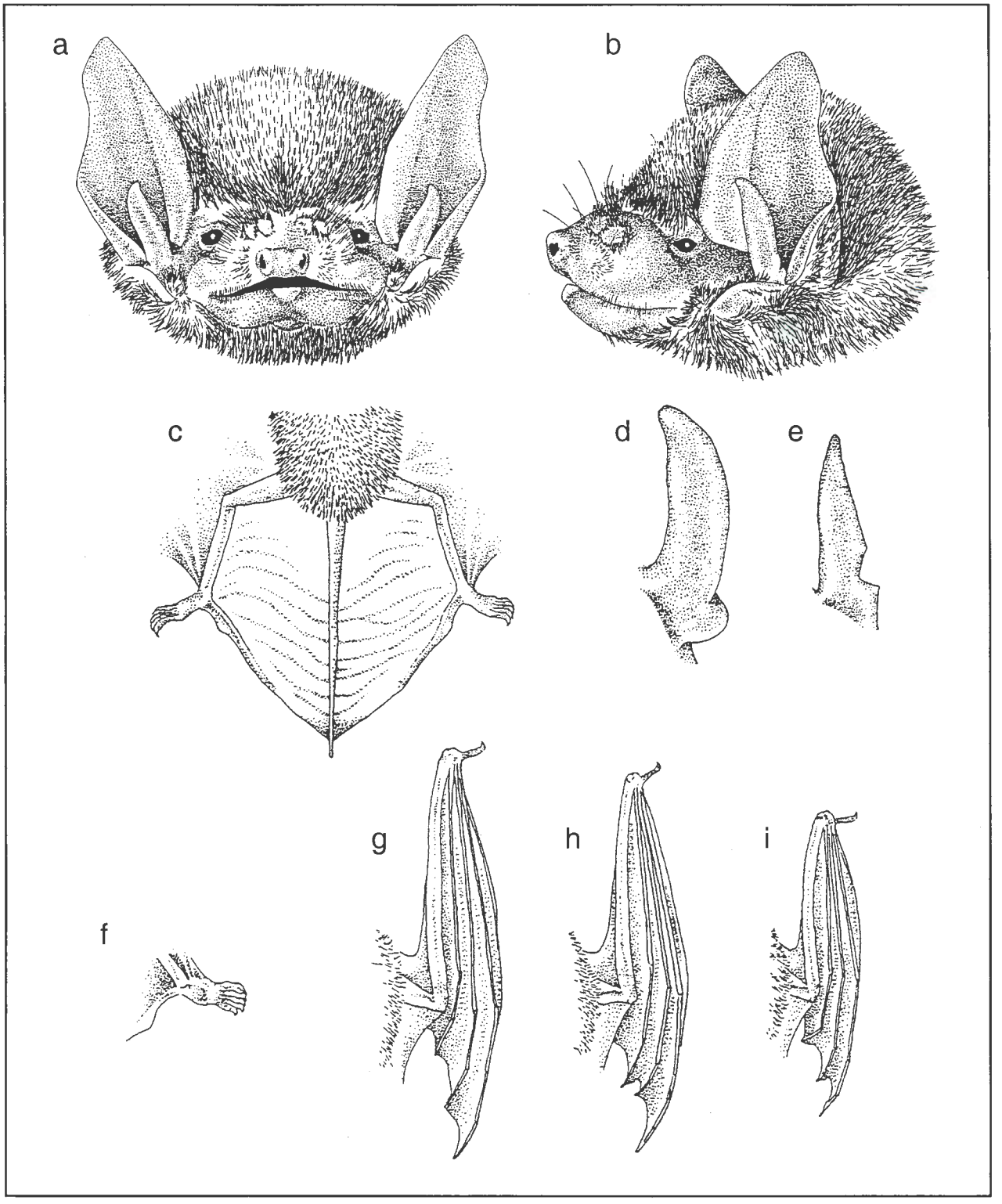


Figure 86. *Eptesicus furinalis* (a, b, c, d, f, and h), *Eptesicus brasiliensis* (g), and *Eptesicus diminutus* (e and i): (a) face, frontal view; (b) face, lateral view; (c) uropatagium; (d) tragus; (e) tragus; (f) hind foot; (g) forearm; (h) forearm; and (i) forearm.

mens of *E. furinalis* from arid and semiarid regions, particularly those from Huyamampa, Santiago del Estero, are similar in color to those of the type series of *E. b. argentinus* from Goya.

In general terms, the external and cranial characters are similar to those described for *E. furinalis*; they can only be discriminated by size (see measurements).

Measurements.— Table 11.

Comments.— Biology unknown. Data in the literature are scarce and identification of the specimens to which they refer is unclear.

Specimens Examined (9).— CORRIENTES: Goya, 5 (BMNH); Goya, 600 m, 4 (BMNH, including the type of *Eptesicus argentinus*).

Additional Records.— CHACO: Puente sobre el Río Bermejo (Massoia, 1976). CORRIENTES: Estancia El Pilar, 2 km de parada Tataré (Romaña and Toranzos, 1947).

Eptesicus diminutus Osgood

Eptesicus diminutus Osgood, Field Museum of Natural History, Zoological Series, 10:197, 1915.

Dobson (1885) described *Vesperugo* (*Vesperus*) *dorianus* from Misiones Province, but Thomas (1920*b*) said that this was a synonym of *E. furinalis*. Osgood (1915) described *E. diminutus* based on specimens from Brazil, and Thomas (1920*a*) described *E. fidelis* based on specimens from Esperanza, Santa Fe, Argentina. Cabrera (1930) synonymized *E. dorianus* with *E. furinalis* and maintained *E. fidelis* as a valid species; later, Cabrera (1958) considered *E. diminutus* and *E. fidelis* to be distinct species. Davis (1966) included *E. dorianus* in the *E. innoxius* species group. Using the characters that identify this group, such as small forearm size, and the measurements of the specimens of Dobson and those of Thomas, Davis (1966) concluded that *E. dorianus* and *E. fidelis* were conspecific. Davis maintained *E. dorianus* as the valid name for the small species from South America and recognized two subspecies; *E. d. dorianus* (Dobson, 1885) and *E. d. diminutus*. Davis considered *E. fidelis* Thomas to be a synonym of *E. dorianus*.

Williams (1978) suggested that the best way to treat the name *E. dorianus* would be to designate it as a nomen dubium, based on the holotype being too large for the small species of the genus. Williams (1978) further suggested that the measurements of the holotype that he obtained from the Museo Civico di Storia Naturale, Genova, corresponded to *E. brasilensis*. However, the measurements given by Williams (1978) do not agree with those of Dobson, although Dobson did not provide skull measurements; the body measurements are too large for *E. diminutus*, too small for *E. brasiliensis*, and are only similar to those of *E. furinalis*. The cranial measurements of the holotype of *E. dorianus* (Williams, 1978) correspond to *E. brasiliensis*. The cotype of *E. dorianus* from San Ignacio, Misiones Province, in the BMNH (BMNH 86.11.3.13), which was received in an exchange with the Museo Civico di Storia Naturale, Genova, has not had the skull removed, but the specimen is identical to *E. furinalis* (R. M. Barquez, personal observation). The specimen used by Dobson may be a composite specimen and in this case the nomenclature proposed by Williams (1978) should be retained: *E. dorianus* would be considered nomen dubium and the remaining available names would be *E. diminutus* and *E. fidelis*. Since *E. diminutus* has priority, the two subspecies would be: *E. d. diminutus* and *E. d. fidelis*. The latter is found in Argentina.

Type Locality.— Brazil, Bahia, Rio Preto, São Marcello.

Distribution.— The distribution is poorly known, for there are few records and the limits between the two subspecies are unclear. The general distribution of the species includes northern Argentina, Uruguay, and southern Brazil, extending northward in Brazil as a narrow strip to approximately 5° S latitude. The northern area of distribution corresponds to *E. d. diminutus*. Ibáñez Ulargui (1981) reported this species in Venezuela, but its subspecific status is unclear in view of its apparent isolation from the other populations.

Eptesicus diminutus fidelis Thomas

Eptesicus fidelis Thomas, Annals and Magazine of Natural History, ser. 9, 5:366, 1920.

Eptesicus diminutus fidelis: Williams, Annals of Carnegie Museum, 47:380-382, 1978.

Type Locality:— Argentina, Santa Fe, Esperanza.

Distribution in Argentina.— Figure 87.

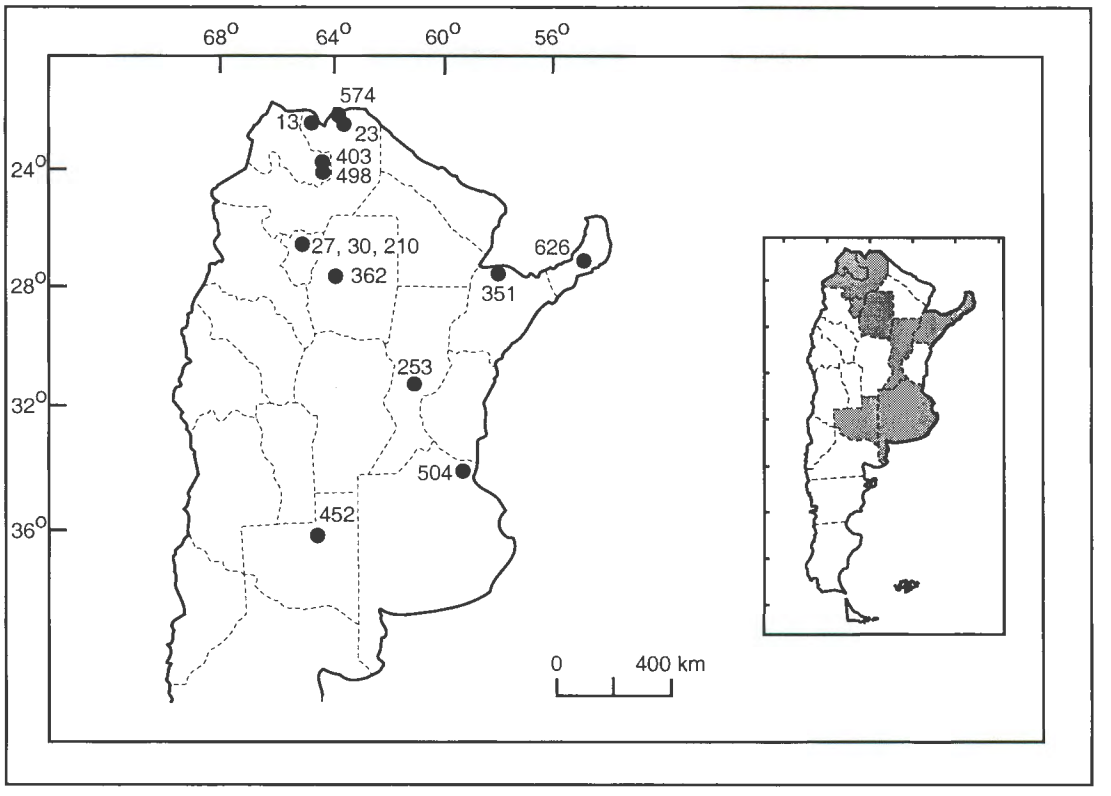


Figure 87. Map of the localities of *Eptesicus diminutus*.

Description (Figs. 86e, 86i, and 88).— Specimens from the Paraná and Uruguay river drainages are lighter in color and larger in size than those from northwestern Argentina; one individual from Itatí, Corrientes Province (BMNH), is an exception. The light brown tips of the hairs give a light, frosted appearance to the dorsum; hairs of the venter are lighter, with the tips grayish or brown. Specimens from the provinces of Salta and Tucumán are smaller and have unicolored hairs. Those from Buenos Aires, Delta del Paraná, and Uruguay, can be confused easily with specimens of *M. albescens* from northwestern Argentina because of their frosted color, the same as the type of *E. fidelis*. In specimens having a frosted appearance, the basal one-half of the dorsal hairs is very dark, almost black, and the distal one-half is yellow, with the tips pale. Those from the Northwest are similar in color to *E. furinalis*, but can be distinguished by size. The best characteristics to identify this species are length of forearm, length of the mandible, and length of the toothrow. In the specimens examined, length of the forearm varied between 32.1 and 34.8 mm, the length of the mandibular toothrow between 4.8 and 5.4 mm, and the length of the mandible from 9.3 to 10.1 mm. The external characters are similar to those of *E. furinalis*, but the calcar is proportionally longer (more than double the length of the foot), the tips of the ears are more rounded, and the tragus has a less-developed basal lobe.

The skull is similar, but less robust, and with less-developed sagittal and lambdoidal crests.

Measurements.— Table 11.

Comments.— The biology of this species throughout its range is almost unknown. We captured a lactating female and a juvenile male in the forests of Aguas Chiquitas, Tucumán, at the end of January. Ibáñez Ulargui (1981) noted that all specimens obtained from Venezuela were found inside dwellings in open areas. Stomachs contained insects, mainly coleopterans. Specimens from Argentina inhabit a wide variety of habitats including grasslands, disturbed urban areas, and dense forests.

Specimens Examined (16).— BUENOS AIRES: Paraná de Las Palmas y Canal 6, 1 (CML).

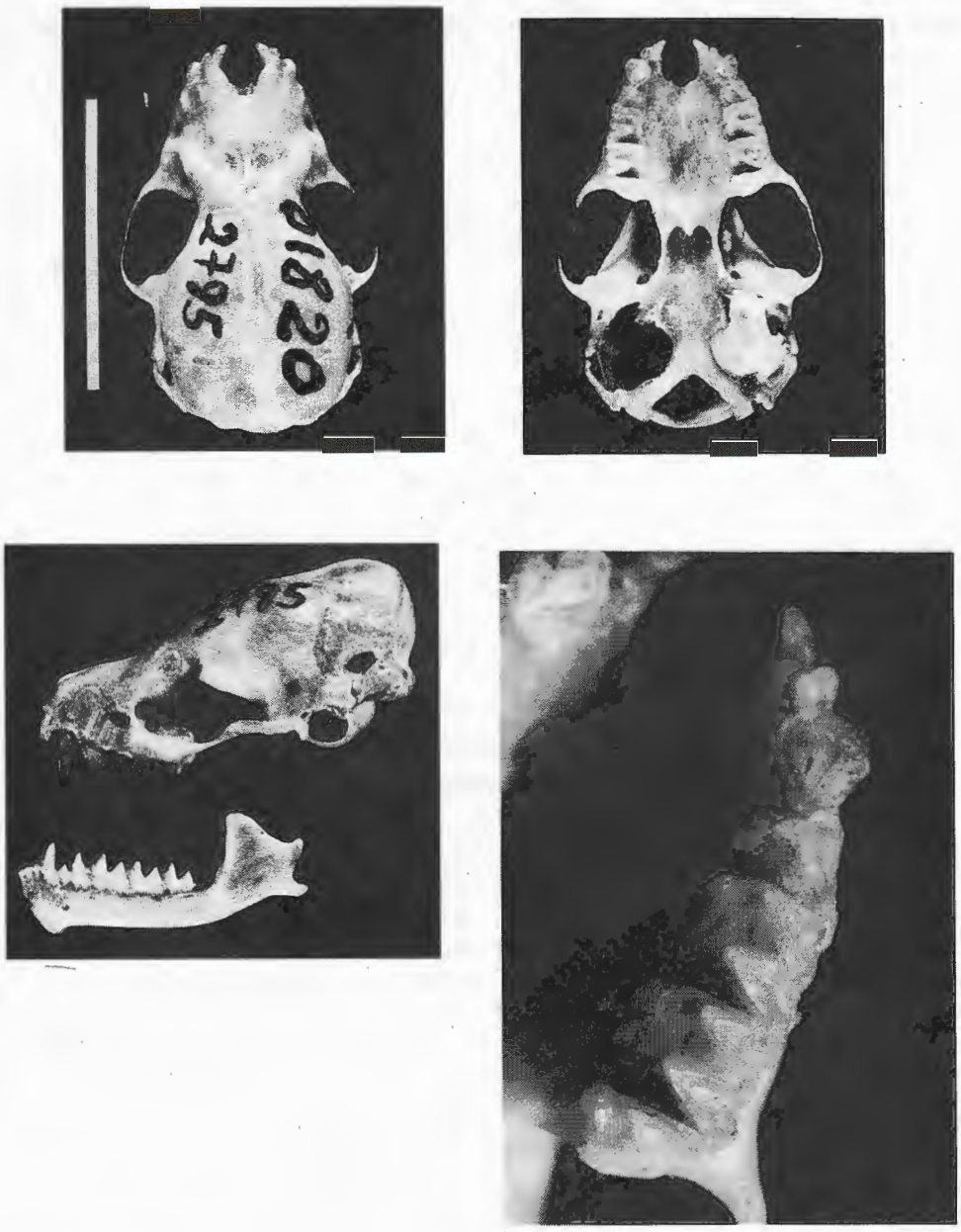


Figure 88. Skull and teeth of *Eptesicus diminutus*. Adult male from Delta de Paraná, Buenos Aires Province (CML 1820). Bar = 1 cm. Teeth not to scale.

CORRIENTES: Itatí, 1 (BMNH). JUJUY: Laguna La Brea, 25 km W Palma Sola, 1 (CML). LA PAMPA: Luan Toro, 25 km S, 5 (EJ). SALTA: Agua Blanca, 24 km NW, 1 (CM); Aguaray, 700 m, 1 (MACN); Quebrada de Acambuco, 5 km W Dique Itiyuro, 1 (RAO). SANTA FE: Esperanza, 1 (type of *E. fidelis*, BMNH). TUCUMÁN: Aguas Chiquitas, 1 (CM); Aguas Chiquitas, Sierras de Medina, 800 m, 2 (CM); El Cadillal, Estación de Piscicultura, 1 (CM).

Additional Records.— JUJUY: Palma Sola (Villa-R. and Villa-C., 1971). MISIONES: Río Victoria (Massoia, 1980). SANTIAGO DEL ESTERO: La Banda (Romaña and Abalos, 1950).

Table 11. Measurements of Eptesicus brasiliensis, Eptesicus diminutus, *and* Eptesicus furinalis. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Eptesicus brasiliensis*	*Eptesicus diminutus*	*Eptesicus furinalis*
Total length	108.8 ± 6.27, 6 101.0 - 117.0	86.1 ± 3.68, 6 81.0 - 91.0	97.2 ± 9.58, 41 80.0 - 140.0
Tail length	43.8 ± 4.30, 6 37.0 - 49.0	33.9 ± 1.83, 7 32.0 - 37.0	40.0 ± 3.81, 42 32.0 - 49.0
Hindfoot length	9.1 ± 1.47, 6 8.0 - 11.0	6.3 ± 0.57, 7 5.6 - 7.0	8.1 ± 1.01, 39 6.0 - 10.1
Ear length	16.8 ± 0.98, 6 16.0 - 18.0	13.8 ± 0.48, 7 13.3 - 14.6	14.2 ± 1.82, 42 10.0 -18.5
Forearm length	43.0 ±1.91, 6 40.5 - 45.0	33.2 ± 0.98, 8 32.1 - 34.8	39.8 ± 1.54, 59 36.5 - 42.5
Weight	5.9 ± 0.65, 5 4.9 - 6.5	10.6 ± 2.22, 31 7.0 - 14.0	
Condylobasal length	15.8 ± 0.31, 5 15.6 - 16.4	12.7 ± 0.19, 7 12.4 - 13.0	14.7 ± 0.47, 51 13.6 - 15.7
Least interorbital breadth	6.4 ± 0.47, 5 5.9 - 7.2	5.0 ± 0.33, 6 4.5 - 5.3	5.7 ± 0.31, 53 5.1 - 6.5
Zygomatic breadth	12.0 ± 0.07, 2 12.0 - 12.1	9.1 ± 0.15, 5 8.9 - 9.3	10.6 ± 0.43, 44 9.8 - 11.8
Greatest length of skull	17.0 ± 0.33, 5 16.7 - 17.4	13.2 ± 0.22, 7 12.9 - 13.6	15.4 ± 0.47, 52 14.3 - 16.3
Postorbital constriction	4.0 ± 0.12, 5 3.8 - 4.1	3.7 ± 0.15, 7 3.5 - 4.0	3.8 ± 0.18, 54 3.6 - 4.4
Breadth of braincase	7.7 ± 0.21, 5 7.5 - 8.1	6.6 ± 0.17, 7 6.5 - 7.0	7.3 ± 0.30, 52 6.7 - 8.0
Length of maxillary toothrow	6.4 ± 0.20, 5 6.2 - 6.7	4.8 ± 0.13, 7 4.6 - 5.0	5.7 ± 0.19, 55 5.3 - 6.3
Palatal length	7.6 ± 0.21, 5 7.5 - 8.0	6.1 ± 0.10, 3 6.0 - 6.2	7.0 ± 0.34, 41 6.5 - 7.9
Mastoidal breadth	9.1 ± 0.30, 5 8.7 - 9.5	7.2 ± 0.19, 7 6.9 - 7.5	8.4 ± 0.35, 50 7.7 - 9.1
Length of mandibular toothrow	6.8 ± 0.11, 5 6.7 - 7.0	5.1 ± 0.21, 6 4.8 - 5.4	6.1 ± 0.22, 54 5.6 - 6.8
Length of mandible	13.1 ± 0.23, 5 12.9 - 13.5	9.8 ± 0.30, 7 9.3 - 10.1	11.9 ± 0.38, 54 11.0 - 13.0
C-C (width across canines)	5.5 ± 0.15,5 5.3 - 5.7	4.0 ± 0.12, 7 3.9 - 4.2	4.8 ± 0.21, 51 4.4 - 5.6
M-M (width across molars)	7.3 ± 0.23, 5 7.1 - 7.6	5.6 ± 0.17, 7 5.5 - 5.9	6.5 ± 0.29, 50 5.7 - 7.4

Eptesicus furinalis (d'Orbigny)

Vespertilio furinalis d'Orbigny, Mammifères. *In* Voyage dans l'Amérique Méridionale (le Brésil, la République orientale de Uruguay, la République Argentine, la Patagonie, la République du Chili, la République de Bolivia, la République du Pérou), exécuté pendant les années 1826, 1827, 1828, 1829, 1830, 1831, 1832, et 1833. Tome Quatrième. 2e Partie. (A. d'Orbigny, ed.). Pitois-Levrault, et cie, Paris, 4:13, 1847.

Eptesicus furinalis: Thomas, Annals and Magazine of Natural History, ser. 9, 5:365, 1920.

Type Locality.— Argentina, Corrientes.

Distribution.—*Eptesicus furinalis* is widely distributed in the Neotropics. It is absent from the region west of the Andes in Peru and Bolivia, and it is not known from Chile or Uruguay. However, some of the specimens from Uruguay (Acosta y Lara, 1950) may be *E. furinalis* and not *E. brasiliensis*, based on measurements given in that publication. Davis (1966) included three subspecies in South America: *E. f. gaumeri* in the Guianas, northern Venezuela, and Colombia northward to Central America; *E. f. chapmani* in the Amazon basin in Brazil, southern Colombia, and northern Bolivia; and *E. f. furinalis* in Argentina, southern Bolivia, Paraguay, Uruguay, and southern and eastern Brazil. Mies et al. (1996) recognized six subspecies for South America: *E. f. chapmani*, *E. f. chiralensis*, *E. f. findleyi*, *E. f. furinalis*, *E. f. guameri*, and *E. f. montosus*, with *E. f. findleyi* and *E. f. furinalis* occurring in Argentina. Williams (1978) had described *E. f. findleyi* for specimens from northwestern Argentina east of the mountains in the provinces of Tucumán, Salta, and Jujuy based on characters of size and color. However, many specimens examined from this region exhibit characters of *E. f. furinalis* rather than *E. f. findleyi*, and we consider the taxa to be synonymous. Analyses of larger series from more localities indicate that this is a highly variable species, thus differences in size and color are insufficient to support the creation of a different subspecies.

The dorsal coloration is highly variable. Specimens from Santiago del Estero can be lighter than those from Tucumán, which would contradict the diagnostic characters for *E. f. findleyi*. On the other hand, color may be influenced by the environment, for specimens from arid and semiarid zones are generally pale, while those from forests are dark. *E. f. findleyi*, according to Williams (1978), is larger than the other subspecies. In specimens from Tucumán Province, the length of the forearm ranges from 39.3 to 41.1 mm, but in a series from Huyamampa, Santiago del Estero Province, the maximum measurement is 42.6; the length of the forearm is greater than 40 mm in 11 of the 13 individuals examined. Myers and Wetzel (1983) compared 17 specimens from Jujuy Province (assigned to *E. f. findleyi* by Williams, 1978) with a series from Paraguay. They found that those from eastern Paraguay were larger and darker, and those from the central chaco were lighter, but with variable dorsal coloration where the hairs are banded and the tips lighter. Consequently, they could not justify treating specimens from Jujuy and the central chaco as different subspecies. We found the same pattern when examining specimens from throughout their distribution in Argentina. The characters of both subspecies overlap considerably, such that one can assign specimens at any point along the range to one or another subspecies. This situation implies that either only a single subspecies is present, or that two very similar subspecies are in complete sympatry.

Eptesicus furinalis furinalis (d'Orbigny)

Vespertilio furinalis d'Orbigny, Mammifères. In Voyage dans l'Amérique Méridionale (le Brésil, la République orientale de Uruguay, la République Argentine, la Patagonie, la République du Chili, la République de Bolivia, la République du Pérou), exécuté pendant les années 1826, 1827, 1828, 1829, 1830, 1831, 1832, et 1833. Tome Quatrième. 2e Partie. (A. d'Orbigny, ed.). Pitois-Levrault, et cie, Paris, 4:13, 1847.

Eptesicus furinalis furinalis: Davis, The Southwestern Naturalist, 11:265, 1966.

Type Locality.— Argentina, Corrientes.

Distribution in Argentina (Fig. 89).— Cabrera (1958) considered *Vesperugo dorianus* Dobson a synonym of this species. Williams (1978) treated it as nomen dubium (see discussion in *E. diminutus*), but the cotype from the BMNH is here included in *E. furinalis*.

Description (Figs. 86a, 86b, 86c, 86d, 86f, 86h, and 90).—Size medium for Argentine *Eptesicus*, with the length of the forearm varying from 37.0 to 42.6 mm, and rarely exceeding 41 mm. Color varies throughout the range, but is uniform within populations. Specimens from Formosa have a dark brown dorsum and the bases of the hairs are slightly lighter than the tips. Those from Tucumán and Salta provinces are similar to those from Formosa Province, especially in ventral coloration, but the hairs of the dorsum are strongly bicolored. The bases are almost black and the tips are light brown. Individuals from Santiago del Estero Province are even lighter and the tips of the dorsal hairs are yellowish brown. The color of the venter is similar in almost all specimens examined; the bases of the hairs are dark brown to black and the tips are yellow brown. The membranes are dark, with black tints in some specimens. The pelage does not extend over the membranes on the dorsal

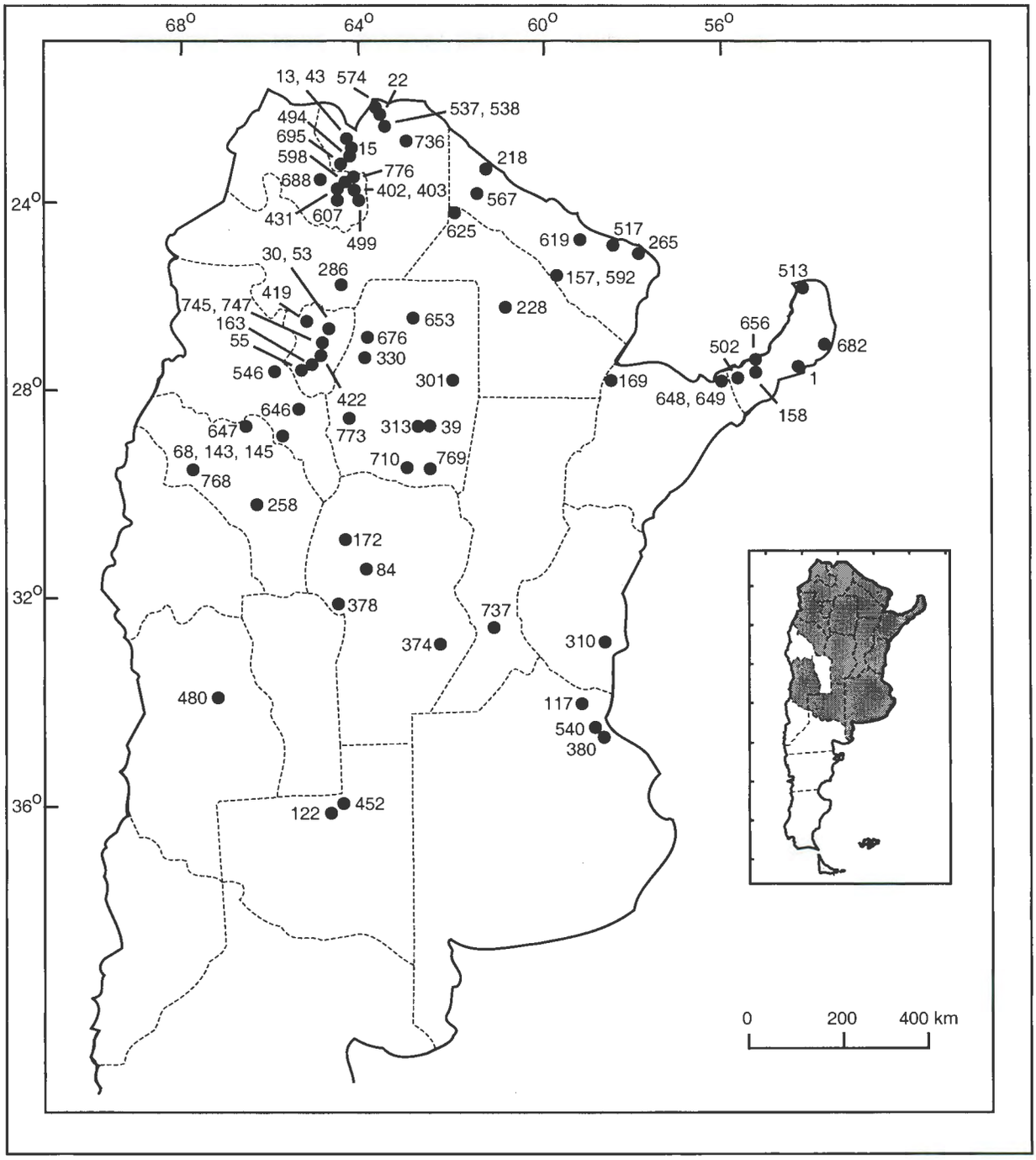


Figure 89. Map of the localities of *Eptesicus furinalis*.

side, except over the base of the uropatagium, but never as much as in *Myotis*. Ears are medium-sized and well separated, have rounded tips, and have an internal keel extending from the upper concavity of the conch halfway up the anterior margin; the upper one-half of the external margin of the ears is straight and lower one-half is convex. The tragus is well developed, blunt, and slightly widened at the base. The lips are fringed with fine hairs and, except for a triangular-shaped papilla on the lower lip, papillae are absent. A distinctive wart covered with long, fine black hairs can be observed in fresh or alcoholic specimens. In dry specimens, this

structure is seen only as a tuft of long, black hairs. The uropatagium is wide and contains the tail, which extends beyond the distal margin about 3.5 to 4.0 mm. The calcar is well developed, slightly more than double the length of the foot, and with a fleshy lateral expansion at its mid-point.

The skull is robust, its greatest length between 15.2 and 16.5 mm; the rostrum is slightly more than one-half the width of the braincase; the sagittal crest is visible (generally more developed in adult females) and more elevated on the posterior one-third of the skull. Lambdoidal crests are evident and zygomatic arches are thin but strong and slightly widened medially. Anteriorly, the palate has a deep invagination that separates the incisors of each side; posteriorly, the palate extends beyond the last molar. The pterygoids are well developed, and the tympanic bullae are large and cover more than one-half of the cochlea.

The I1 is well developed and I2 is small, its tip barely reaching the cingulum of the I1. A small space about equal to the length of I2 is present between the incisors and the canines. Canines are normal, but with a posterior keel aligned with the toothrow. P1 is close to the canine and well developed. The M1 and M2 are similar in appearance and size, with four commissures forming the "W" pattern typical of insectivorous molars; the protocone is well developed, but the hypocone is reduced or absent; M3 is reduced with only three commissures; the protocone is present but the hypocone is absent.

Lower incisors are trilobed, overlapping and completely filling the space between the canines. The canines have a posterior projection that is in contact with p1. The p1 is about one-half of the size of p2, both with a single well-developed cusp; p2 has a small metaconid in contact with the paraconid of m1. The molars are structurally identical, with all the cusps well developed, permitting a clear distinction of the talonid and trigonid; molars differ only in size, the second being the largest and the third the smallest. The incisors of juveniles are occasionally bifid, a condition rarely observed in adults.

Measurements.— Table 11.

Comments.— The biology of this species is poorly known. Parasites of this species were studied by Romaña and Abalos (1947) from specimens collected from various dwellings. The specimen from Colonia km 503, 16 km S, Formosa Province, was captured under the bark of a tree (Barquez and Ojeda, 1992). This species has been taken in many habitats, including wet forest, gallery forest, chacoan thorn scrub, and transitional forest (Mares et al., 1995). Brosset and Charles-Dominique (1990) found *E. f. gaumeri* in disturbed and suburban areas in French Guiana. Reproductive patterns studied by Myers (1977) in Paraguay indicate two periods of reproductive activity—one in mid-July and August and a second shorter period in January. Postpartum copulation and ovulation also were detected; lactating females were found to be pregnant. In Río Porteño, Formosa, we found a male with scrotal testes in mid-May and at Angosto del Pescado, Serranía de las Pavas, Salta Province, in mid-November. Lactating females were found in mid-November at Angosto del Pescado, Serranía de las Pavas and at Quebrada de Acambuco, 5 km W Dique Itiyuro, Salta Province. This species is known to be preyed upon by Stygian owls (*Asio stygius*) in the cerrado savanna of Brazil (Motta Junior and Taddei, 1992).

Specimens Examined (210).— BUENOS AIRES: Canal 6, Delta bonaerense, 1 (FCM); La Plata, 4 (1 BMNH, 3 MLP); Los Cisnes, Delta del Paraná, 5 (BMNH); Plátanos, 1 (MACN). CATAMARCA: Balneario El Caolín, 6 km NW Chumbicha, 8 (OMNH); Chumbicha, 1 km N and W of balneario by road, 2,600 ft., 4 (1 CML, 1 IADIZA-CM, 2 OMNH); Chumbicha, at balneario, 2,400 ft., 1 (OMNH); Potrero River Dike, El Potrero, 1 (MSB); San Antonio de la Falda, 1 (CML). CHACO: El Mangrullo, 20 km NNW by road and 11 km NE by road, 40 (21 CML, 16 IADIZA-CM, 3 OMNH); Río Teuco, 10 km W Tartagal, 2 (CML). CÓRDOBA: Bialet Massé, 2 (MACN); Cruz del Eje, 1 (BMNH); La Maya, 45 km SE Bell Ville, 1 (MVZ); La Paz, 3 (MACN); Villa Walcarde, 1 (MVZ). CORRIENTES: San Borgita, 3 (1 BMNH, 1 MACN, 1 TTU); San Borgita, Estero de Iberá, 5 (CEM). ENTRE RÍOS: Delta, Brazo Largo, 1 (CEM); Gualeguaychú, 5 (2 ROM, 2 TCWC, 1 TTU). FORMOSA: Colonia km 503, 16 km S, 1 (CML); El Churcal, approx. 10 km SSE Buena Vista, 3 (1 CML, 2 IADIZA-CM); Estancia Las Mercedes, 1 (MACN); Puesto Divisadero, 35 km S, 5 km E Ing. Guillermo N. Juárez, 1 (CML); Río Bermejo, 10 mi S Colonia km 503, 1 (CML); Río Porteño, 5 km S Estancia Santa Catalina, 2 (CML). JUJUY: Laguna La Brea, 1 (CML); Laguna La Brea, 25 km W Palma Sola, 1 (CML); Ledesma, 1 (AMNH);

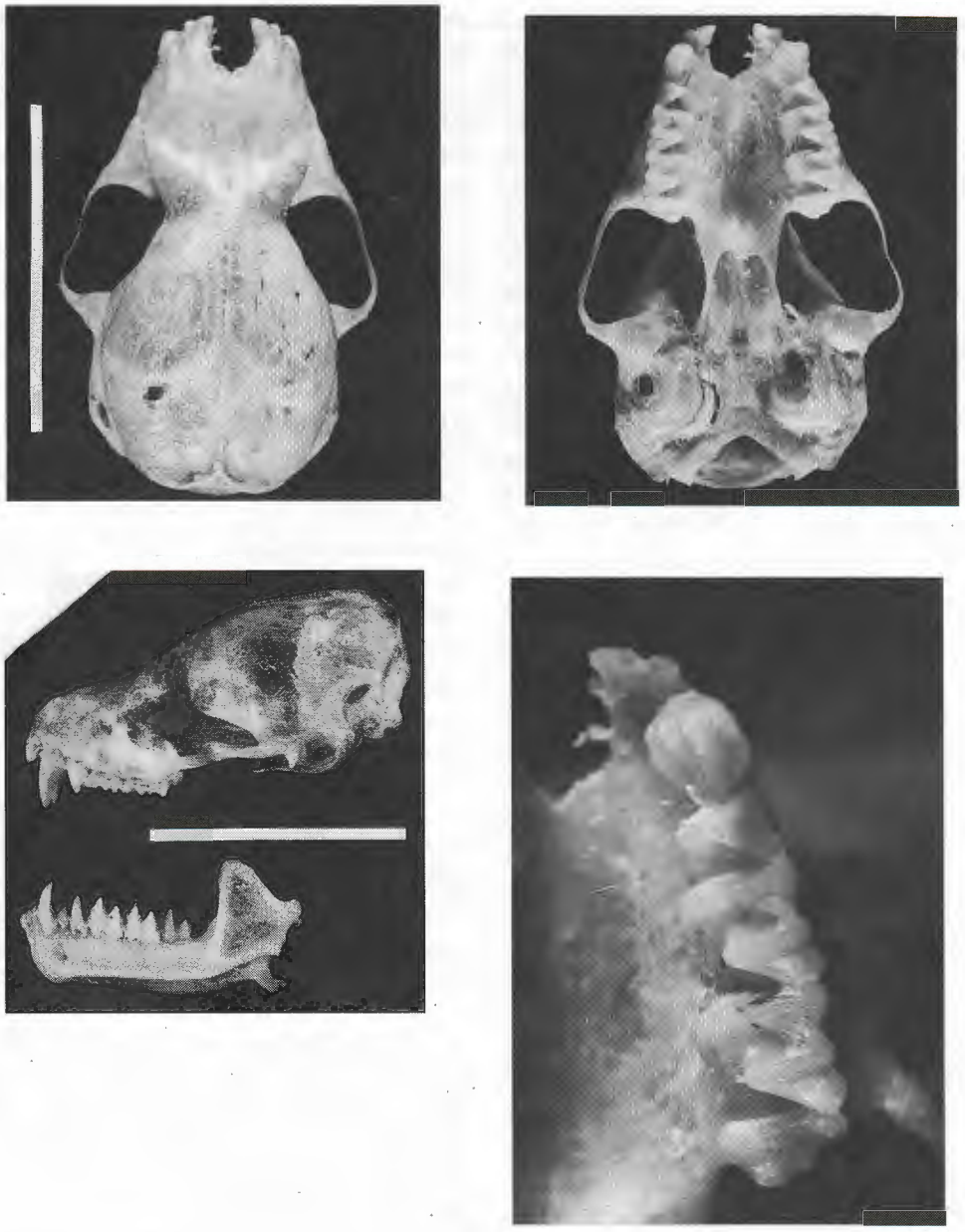


Figure 90. Skull and teeth of *Eptesicus furinalis*. Adult male from Serranía de las Pavas, Salta Province (OMNH 18677). Bar = 1 cm. Teeth not to scale.

Río de Zora y cruce con ruta 34, 1 (CML); Río Ledesma, 14 km S Pueblo Ledesma, 1 (CML); Santa Bárbara, 4 (AMNH); Yuto, 22 (19 AMNH, 1 BMNH, 2 MACN). LA PAMPA: Luan Toro, 25 km S, 1 (EJ). LA RIOJA: Estación Patquía, Guayapa, 1 (CML); San Blas de los Sauces, 4 km SE San Blas, 1 (CML); Villa Unión, 4 (MACN). MENDOZA: Ñacuñán, 4 (1 CEM, 3 IADIZA-CM). MISIONES: 6 km NE by Highway 2 of jct. Highway 2 and Arroyo Paraíso, 1 (CML); Arroyo Urugua-í, 1 (OMNH); Colonia Mártires, 1 (MACN); Parada Leis, 5 (MACN); Parque Nacional Iguazú, 3 (1 CML, 2 OMNH); San Ignacio, 1 (co-type of *V. dorianus*, BMNH); San Pedro, 47 km SE, 1 (CML). SALTA: Agua Blanca, 24 km NW, 1 (MSB); Agua Blanca, 5 km W, 4 (2 MACN, 2 TTU); Aguaray, 1 (MACN); Angosto del Pescado, Serranía de Las Pavas, 1 (OMNH); Finca San

Lorenzo, Rosario de La Frontera, 1 (MACN); Orán, 1 (CML); Piquirenda Viejo, 6 km W, 3 (1 CML, 2 OMNH); Piquirenda Viejo, 8 km W, 1 (CML); Quebrada de Acambuco, 5 km W Dique Itiyuro, 6 (2 CM, 1 OMNH, 3 RAO); Santa María, sobre Río Santa María, 1 (CML); Tonono, 1 km E sobre Río Itiyuro, 1 (CML). SANTA FE: Totoras, 2 (1 MACN, 1 TTU). SANTIAGO DEL ESTERO: Huyamampa, 14 (CML); San Felix, 1 (MACN); San Pedro, 1 (TTU); Virgen del Valle picnic area on Highway 64 between Santa Catalina and La Puerta Chiquita, 1 (OMNH). TUCUMÁN: Aguas Chiquitas, Sierras de Medina, 800 m, 4 (CM); Arroyo Aguas Chiquitas, Reserva Provincial Aguas Chiquitas, 3 (CML); Arroyo El Saltón, Reserva Provincial Santa Ana, 1 (CML); Concepción, 3 (BMNH); Las Mesadas, 1 (CML); Las Talas, 4 km al N de Bella Vista, 2 (OMNH); Tucumán, 450 m, 1 (BMNH); Tucumán, ciudad, 1 (CML).

Additional Records.— CORRIENTES: Corrientes (Davis, 1966). FORMOSA: Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.). JUJUY: Palma Sola, 550 m (Villa-R. and Villa-C., 1971). LA PAMPA: Carro Quemado (Santis and Justo, 1978). MISIONES: Arroyo Urugua-í (Massoia et al., 1987). SANTIAGO DEL ESTERO: Añatuya (Romaña and Abalos, 1950); Girardet (Romaña and Abalos, 1950); Herrera (Romaña and Abalos, 1950); Sumampa (Romaña and Abalos, 1950); Villa Unión (Romaña and Abalos, 1950).

Genus *Histiotus*

This genus is exclusively South American. Five species presently are recognized, only one of which, *H. alienus*, has not been reported for Argentina (where it may occur). The other species are *H. macrotus*, *H. magellanicus*, *H. montanus*, and *H. velatus*. *Histiotus* can be easily identified by the very long ears. The skull has the same dental formula as *Eptesicus* (I 2/3, C 1/1, P 1/2, M 3/3, total 32), but the tympanic bullae are much larger and the zygomatic arch has a strongly developed postorbital process of the jugal, which in *Eptesicus* is seen as a slight median widening of the arch. The similarities among the Argentine species and subspecies have led to a taxonomically confused situation.

The distribution of *H. macrotus macrotus* was poorly known in Argentina. Our data show that this subspecies is widely distributed in the country, although with few records. It ranges from Río Negro northward through the arid regions of the Monte Desert to the province of Jujuy. It is sympatric with *H. montanus* over much of its range and frequently has been confused with it. Although both *macrotus* and *montanus* can be similar in coloration and other characteristics, the ears and tympanic bullae of *H. m. macrotus* are larger.

Histiotus magellanicus is smaller and darker than either *H. macrotus* or *H. montanus* and is known only from a few specimens; it is distributed along the western slopes of the Andes from southern Chile to Tierra del Fuego and in Argentina occurs as far north as Neuquén Province.

Histiotus montanus does not occur in northwestern Argentina, at least in the forests, but it has a wide distribution south of 28° S latitude as far as Santa Cruz Province. Previous citations of this species in the northwest correspond to *H. macrotus laephotis*. The subspecies of *H. macrotus* are distinguishable, although some problems could exist in a zone of contact located in southern Tucumán Province along the border with Catamarca Province.

Histiotus velatus is known only from the provinces of Corrientes and Misiones, where it is the only species of *Histiotus* found. *H. alienus* will probably be found to occur there as well. These two species can be differentiated by ear shape—they are rounded in *H. alienus* and triangular in *H. velatus*.

Based on the Specimens Examined, several supposedly diagnostic characters for the species of the Genus *Histiotus* are not especially useful for identification. Determining the presence or absence of the band between the ears is difficult, and erroneous conclusions can lead to species misidentification. This also occurs with the color of the pelage, membranes, and ears, which appear to be both geographically and individually variable. Mann Fischer (1978), for example, found that environmental humidity affected color variation. Specimens of *H. montanus* from humid habitats in central Chile were darker, as were others from southern Chile (presumably *H. magellanicus*); this observation caused Mann Fischer (1978) to doubt the subspecific validity of these taxa (*H. magellanicus* was considered a subspecies of *H. montanus*). All of the specimens showed this pattern, with those from arid zones being pale and those from forests being dark. We found that it was pos-

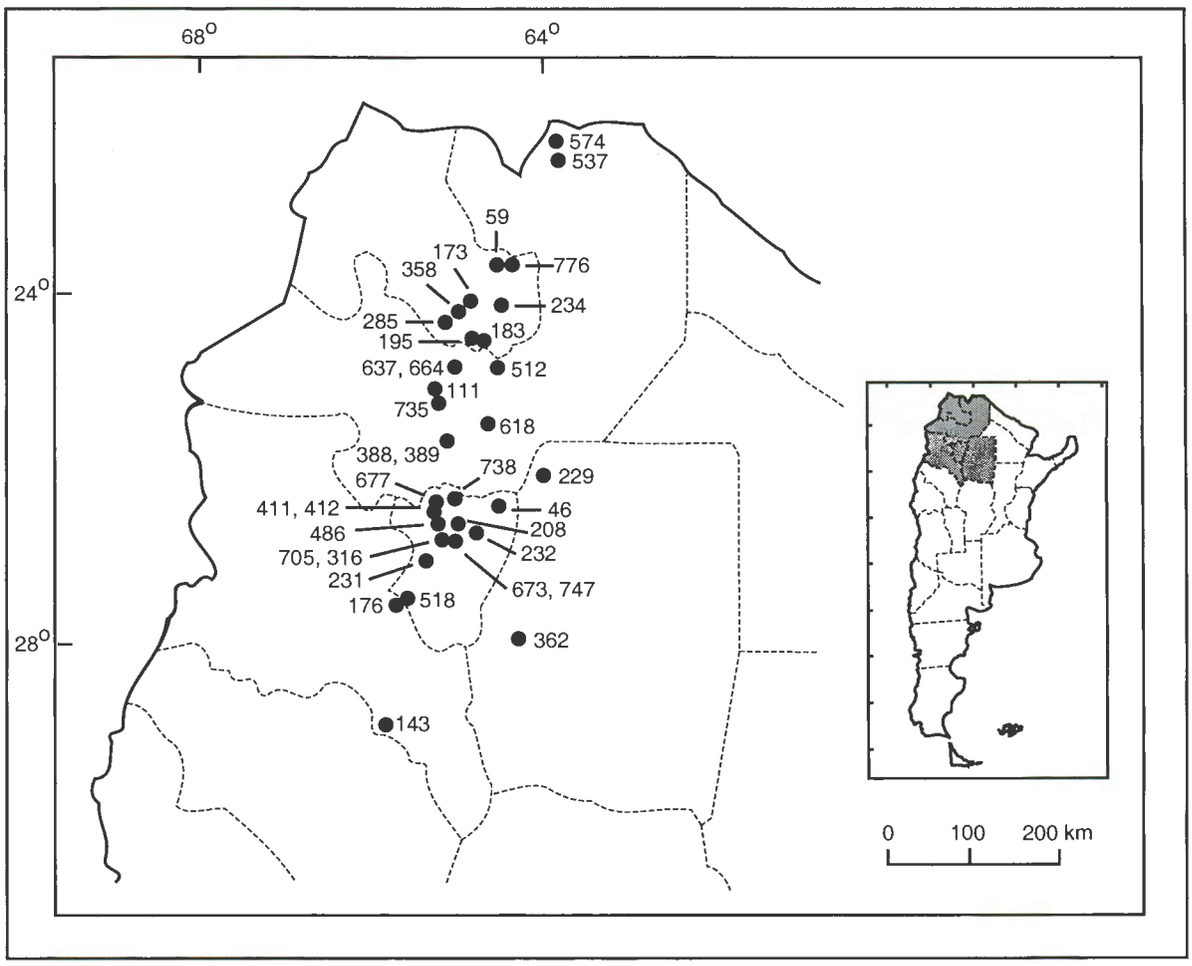


Figure 91. Map of the localities of *Histiotus macrotus laephotis*.

sible to distinguish between two similar species, *H. montanus* and *H. macrotus*, by dividing the length of the head and body by the length of the ear: a ratio between 2.3-3.1 is obtained for *H. montanus*, whereas for *H. macrotus* the ratio falls between 1.4-2.1. Additionally, length of the tympanic bulla is less than 4 mm in *H. montanus*, and greater than 4 mm in *H. macrotus*. There are a few exceptions, but these generally correspond to subadult specimens. The two subspecies of *H. macrotus* can be distinguished by the more robust skull and wider rostrum in *H. m. macrotus*, as opposed to *H. m. laephotis*.

Histiotus macrotus (Poeppig)

Nycticeius macrotus Poeppig, Reise in Chile, Peru und auf dem Amazonenstrome während der Jahre 1827-1832. Friedrich Fleischer, Leipzig, 1:451, 1835.

Histiotus macrotus: Peters, Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, p. 788, 1865.

Type Locality.-Chile, Bío Bío, Antuco.

Distribution in South America.— This species occurs from southwestern Peru and Bolivia to northwestern Argentina southward. In Chile, *H. macrotus* probably reaches Tierra del Fuego, but its distribution there is unclear. Two subspecies are recognized, both occur in Argentina.

Histiotus macrotus laephotis Thomas

Histiotus laephotis Thomas, Annals and Magazine of Natural History, ser. 8, 17:275, 1916.

Histiotus macrotus laephotis: Cabrera, Revista del Museo Argentino de Ciencias Naturales "Bernardino

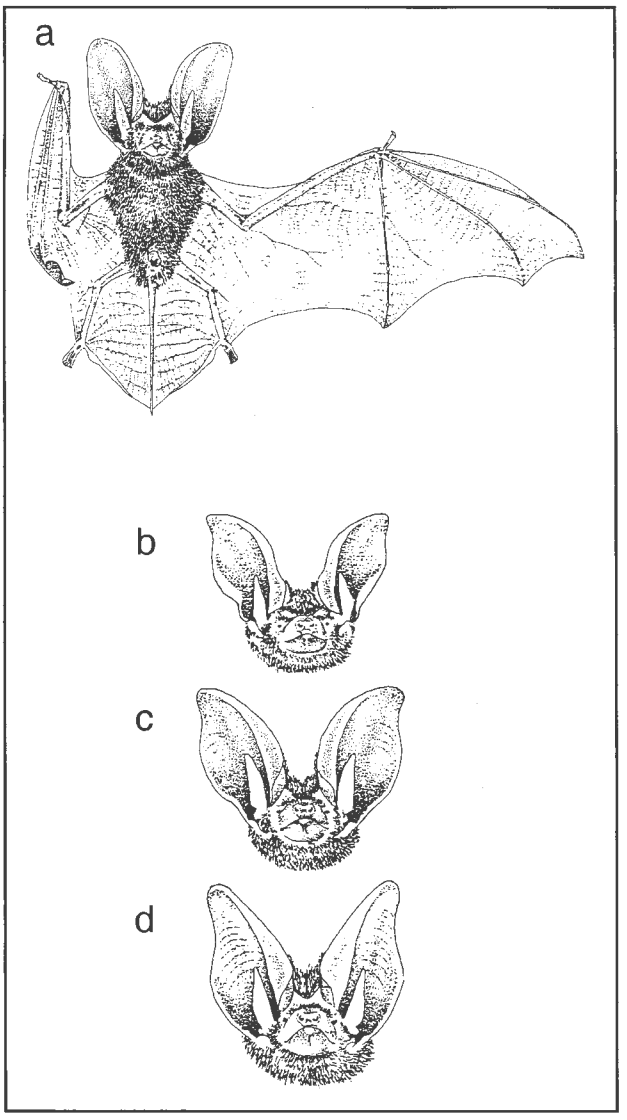


Figure 92. (a) *Histiotus macrotus laephotis*. Faces of : (b) *Histiotus magellanicus*; (c) *Histiotus montanus montanus*; and (d) *Histiotus velatus*.

Rivadavia," e Instituto Nacional de Investigación de las Ciencias Naturales, Ciencias Zoológicas, 4:108, 1958.

Type Locality.—Bolivia, Caiza.

Distribution in Argentina (Fig. 91).— Found only in forests (including thorn forests) and adjacent areas of northwestern Argentina.

Description (Fig. 92a and 93).— This is a medium-sized bat with a length of forearm between 45 and 49 mm. The ears are very large, generally greater than 30 mm, and connected by a thin membranous band. Development of the band is variable and it is generally not evident in dried specimens. The tragus is wide and long, approximately one-half the length of the ear; the antitragus is small, slightly differentiated, and rounded. Wing membranes are thin and almost naked. The calcar is long and thin, extending more than one-half the distance between the foot and the tail. The muzzle is inflated, similar to *Eptesicus*; the upper lips are traversed by small stiff hairs that are oriented downward. Long, sparse hairs also are located over the snout and above the eyes. The pelage is smooth and dense; dorsal coloration is generally dark brown, with little contrast between the bases and tips of the hairs. (In some specimens there is a marked difference.) Ventrally the hairs are strongly bicolored with dark, almost black, bases and yellowish tips. The wing membranes and ears are generally pale gray or brown, and slightly transparent. The tragus and the ears are normally pale and or yellowish.

Although robust, the skull is not as broad as that of *H. m. macrotus*, particularly in the rostrum. Sagittal and lambdoidal crests are practically absent and visible only in a few specimens. The zygomatic arch has a postorbital process of the jugal at its midpoint. The palate is slightly concave centrally and the caudal spine is well developed. The hamular process of the pterygoid projects posteriorly to the level of the glenoid fossa. Tympanic bullae are large and rounded. Teeth and dental formula are similar to *Eptesicus*. External breadth across the third upper molars is less than 7 mm (more than 7 mm in the other subspecies).

Measurements.— Table 12.

Comments.— The biology of this species is almost unknown. Mares et al. (1981) captured this species (reported as *H. montanus*) at Quebrada de Acambuco, 5 km W Dique Itiyuro, Salta Province, in November. A lactating female and a male with abdominal testes were collected. One of the specimens was molting over 60% of its pelage. A female from Piquirenda Viejo, 6 km W, a nearby locality, also was lactating in November. Other specimens captured in Salta and Tucumán during April and May (late fall) were not reproductively active. The specimen from Piquirenda Viejo was captured along with *Anoura caudifer*, *Sturnira lilium*, and *Lasiurus blossevillii* at about 0130h in a net placed over a gully in the forest. It had abundant intestinal parasites, probably of the Or-

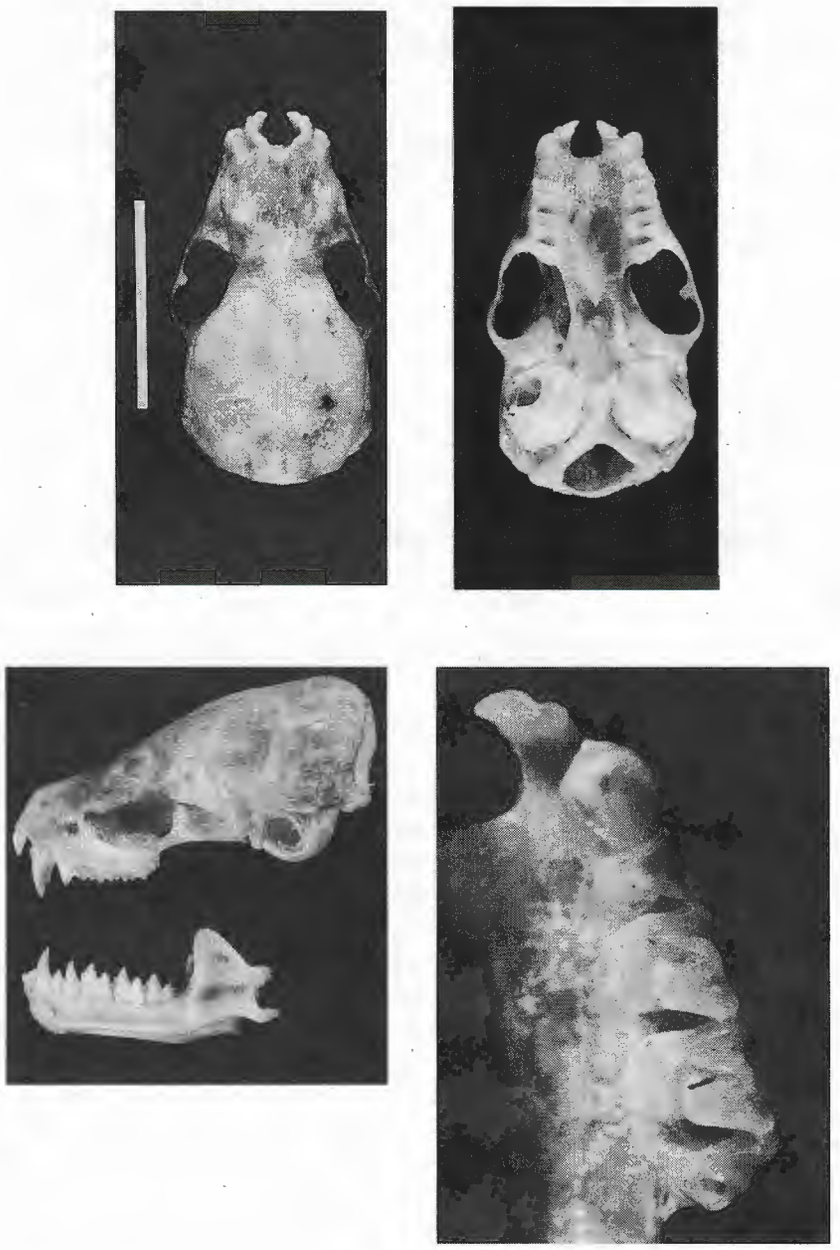


Figure 93. Skull and teeth of *Histiotus macrotus laephotis*. Adult female from San Pedro de Colalao, Tucumán Province (SIG 19). Bar = 1 cm. Teeth not to scale.

der Ciclofilidea. Specimens from San Pedro de Colalao, Tucumán, were captured in a dwelling and flying over the city.

Specimens Examined (48).— CATAMARCA: Chumbicha, 1 km N and W of balneario by road, 2,600 ft., 1 (CML); Cuesta del Clavillo, 5 km S La Banderita, 1 (CML). JUJUY: Arroyo Sauzalito, Parque Nacional Calilegua, 1 (CML); Cucho, San Salvador de Jujuy, 2 (CML); Cueva del Tigre, El Milagro, 1 (MACN); Yuto, 2 (AMNH). SALTA: Campo Quijano, 1 (TCWC); La Viña, 1 (TCWC); La Viña, Iglesia, 1 (MACN); Parque Nacional El Rey, Arroyo de Los Puestos, 2 (CM); Piquirenda Viejo, 6 km W, 1 (OMNH); Quebrada de Acambuco, 5 km W Dique Itiyuro, 3 (1 CM, 2 RAO); Río Piedras, 600 m, 3 (BMNH); Salta, 1 (TTU); San

Table 12. Measurements of Histiotus macrotus laephotis *and* Histiotus macrotus macrotus. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Histiotus macrotus laephotis*	*Histiotus macrotus macrotus*
Total length	111.8 ± 5.72, 24 100.0 - 127.0	120.1 ± 8.16, 13 107.0 - 130.0
Tail length	52.9 ± 3.67, 25 45.0 - 59.2	55.3 ± 3.30, 13 51.0 - 60.0
Hindfoot length	8.9 ± 1.19, 24 7.0 - 12.0	10.1 ± 0.91, 13 8.5 - 11.4
Ear length	33.3 ± 3.42, 25 27.0 - 39.5	35.4 ± 0.89, 13 34.0 - 37.0
Forearm length	47.8 ± 1.21, 26 45.0 - 49.0	48.6 ± 1.43, 15 45.8 - 51.0
Weight	11.2 ± 1.47, 10 9.0 - 14.0	14.7 ± 2.35, 11 9.0 - 18.0
Condylobasal length	16.8 ± 0.37, 21 16.2 - 17.4	17.8 ± 0.52, 14 17.0 - 18.5
Least interorbital breadth	5.8 ± 0.30, 21 5.3 - 6.4	6.3 ± 0.34, 14 5.7 - 7.0
Zygomatic breadth	10.4 ± 0.38, 20 9.6 - 11.2	11.2 ± 0.33, 14 10.4 - 11.6
Greatest length of skull	17.8 ± 0.39, 21 17.0 - 18.4	18.5 ± 0.53, 14 17.5 - 19.3
Postorbital constriction	4.1 ± 0.18, 22 3.6 - 4.5	4.4 ± 0.18, 15 4.1 - 4.8
Breadth of braincase	7.9 ± 0.25, 21 7.4 - 8.4	8.4 ± 0.25, 13 8.1 - 8.9
Length of maxillary toothrow	6.1 ± 0.19, 22 5.9 - 6.7	6.5 ± 0.20, 15 6.1 - 6.8
Palatal length	8.1 ± 0.23, 20 7.7 - 8.6	8.5 ± 0.28, 11 8.0 - 9.1
Mastoidal breadth	9.0 ± 0.20, 21 8.6 - 9.5	9.7 ± 0.29, 13 9.1 - 10.1
Length of mandibular toothrow	6.5 ± 0.22, 22 6.2 - 7.2	7.0 ± 0.17, 14 6.7 - 7.4
Length of mandible	12.5 ± 0.44, 21 11.6 - 13.3	12.7 ± 0.22, 14 12.4 - 13.2
C-C (width across canines)	4.8 ± 0.20, 20 4.6 - 5.3	5.1 ± 0.18, 13 4.7 - 5.4
M-M (width across molars)	6.6 ± 0.25, 21 6.2 - 7.1	7.1 ± 0.23, 14 6.7 - 7.5

Lorenzo, 1 (ROM). TUCUMÁN: Anta Mapú, 1 (MACN); El Cadillal, 1 (CML); El Naranjal, 1 (TTU); El Naranjo, 8 (3 MACN, 5 TTU); Horco Molle, 1 (CM); Las Juntas, 22 km W Choromoro on Hwy 312, 3,500 ft., 1 (OMNH); Ñorco, 1200 m, 2 (BMNH); Parque Provincial El Cochuna, km 40 sobre ruta 47, 1 (PIDBA); San Miguel de Tucumán, 450 m, 1 (CML); San Pedro de Colalao, 4 (SIG); Senda del Cedro Grande, Horco Molle, 1 (CML); Tafí, 2000 m, 1 (BMNH); Trancas, 1 (CML); Tucumán, ciudad, 2 (1 BMNH, 1 CM).

Additional Records.— JUJUY: Dique La Ciénaga, casa del club náutico, 30 km SSW San Salvador de Jujuy, 1000 m (Villa-R. and Villa-C., 1971); El Palmar del Río San Francisco (Del Ponte, 1944); Finca El Palmar (Romaña and Abalos, 1950); Finca La Toma, 25 km SW San Salvador de Jujuy (Villa-R. and Villa-C., 1971); Jujuy ciudad (Romaña and Abalos, 1950). SALTA: Toma de Los Laureles, 6 km SSW Chicoana, 1400 m (Villa-R. and Villa-C., 1971). SANTIAGO DEL ESTERO: El Mojón (Romaña and Abalos, 1950); La

Banda (Romaña and Abalos, 1950). TUCUMÁN: Las Juntas, 22 km W Choromoro (Mares et al., 1995) (=Las Juntas, 22 km W Choromoro on Hwy 312, 3,500 ft..).

Histiotus macrotus macrotus (Poeppig)

Nycticeius macrotus Poeppig, Reise in Chile, Peru und auf dem Amazonenstrome während der Jahre 1827-1832. Friedrich Fleischer, Leipzig, 1:451, 1835.

Histiotus macrotus macrotus: Cabrera, Revista del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," e Instituto Nacional de Investigación de las Ciencias Naturales, Ciencias Zoológicas, 4:108, 1958.

Type Locality.— Chile, Bío Bío, Antuco.

Distribution in Argentina (Fig. 94).— Cabrera's (1930) record of *H. macrotus* from the Department of Belén, Catamarca Province, probably corresponds to this subspecies, although we have not found specimens from that locality among the specimens examined.

Description (Fig. 95).— The band between the ears seems to be variable, but in the specimens examined it is less evident than in *H. m. laephotis*. The tragus is well developed, as in the other subspecies. The general coloration is similar to that of *H. montanus* from the same area. The hairs are strongly bicolored: dorsal hairs have black or dark brown bases and yellowish tips; ventrally, bases of the hairs are dark brown and the tips are whitish, and in some specimens this is pronounced (these specimens resemble *H. montanus* externally, although the size of the ears distinguishes the two species in living or fresh specimens).

The skull is more robust and the rostrum wider than in *H. m. laephotis* or *H. montanus*. From the former, they are differentiated by the external breadth across the third upper molars being greater than 7 mm. From the latter, this subspecies can be distinguished by its greater size and larger tympanic bullae.

Measurements.— Table 12.

Comments.— This subspecies generally has been confused with *H. m. laephotis* and *H. montanus*, thus the data that can confidently be taken from the literature are scarce. Mares et al. (1995) reidentified many specimens from northwestern Argentina as *H. m. macrotus* and clarified the distribution of this species in western Argentina. Specimens from Río Quinto, San Luis Province (MACN and TTU) were captured in a natural cave 8 m deep by 3 m wide, where they were roosting with *Tadarida brasiliensis* and *Myotis* sp. All were pregnant females and one (MACN) had two full-term fetuses according to notes made by the collector on the skin tag. Pearson and Pearson (1989) found a colony of these bats in an attic at Estancia El Condor, Río Negro Province, during the summer month of December; pregnant and lactating females, and nursing young were included in the small colony (containing about 20 bats). A visit to the same colony 5 years later found three adult females, two with attached young.

Specimens Examined (56).— CATAMARCA: Andalgalá, 1 (MACN); Balneario El Caolín, 6 km NW Chumbicha, 2 (OMNH); Choya, 13 km NNW of Andalgalá, 4,000 ft., 1 (OMNH); Chumbicha, 1 km N and W of balneario by road, 2,600 ft., 8 (3 CML, 2 IADIZA-CM, 3 OMNH); Cuesta del Clavillo, 5 km S La Banderita, 5 (CML); Dique El Potrero, 1 (CM); El Rodeo, 900 m, 1 (CML); La Banderita, 1 (CML); La Banderita, Ruta 62 camino a Las Estancias, 1 (CML); Las Estancias, 1 (CML); Los Nacimientos, ruta 40, km 869, 1 (CML); Potrero River Dike, El Potrero, 4 (MSB); Sierra de Ancasti, Ruta 2, 1700 m, 1 (CML); Tinogasta, 1 (MACN). CÓRDOBA: Cura Brochero, 1 (MACN); Río Cuarto, 1 (MACN). JUJUY, Tres Cruces, 8 km al SE, 3600 m, 1 (CML); Tres Cruces, 8 km S, sobre Ruta 9, 2 (CML). NEUQUÉN: Villa La Angostura, 19 km N along Hwy. 234, 3 (1 CML, 2 IADIZA-CM). RÍO NEGRO: Estancia El Cóndor, 22 km ESE Bariloche, 7 (MVZ). SALTA: Cafayate, 20 km NW, 1700 m, 1 (CML). SAN JUAN: Complejo Astronómico El Leoncito, 7 km W, 1 (OMNH). SAN LUIS: Paso del Rey, 1 km N, along Arroyo de la Cañada Honda, 1 (OMNH); Río Quinto, 1 (TTU); Saladillo, Rio Quinto, 2 (1 MACN, 1 TTU). TUCUMÁN: El Nogalar, Ruta 307, 1700 m, 4 (CML); Ruta 307, km 43, 1700 m, 1 (CML); Ruta 307, km 46, 1700 m, 1 (CML).

Additional Records.— CATAMARCA: Departamento Belén (Cabrera, 1930). RÍO NEGRO: Bariloche, 20 km E (Pearson, 1995).

Histiotus magellanicus (Philippi)

Vespertilio magellanicus Philippi, Archiv für Naturgeschichte, 32(1):113, 1866.

Histiotus magellanicus: Thomas, Annals and Magazine of Natural History, ser. 8, 17:273, 1916.

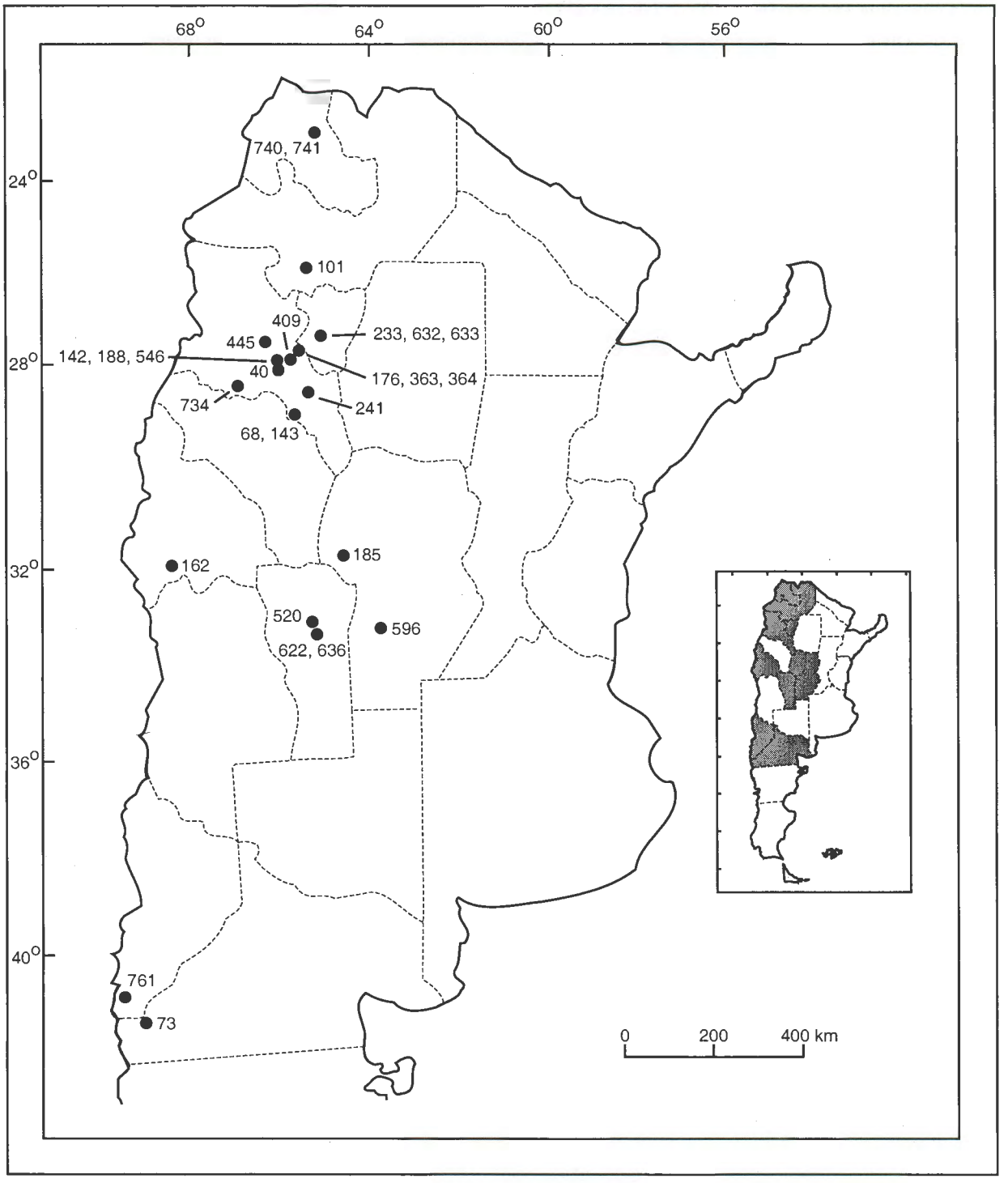


Figure 94. Map of the localities of *Histiotus macrotus macrotus*.

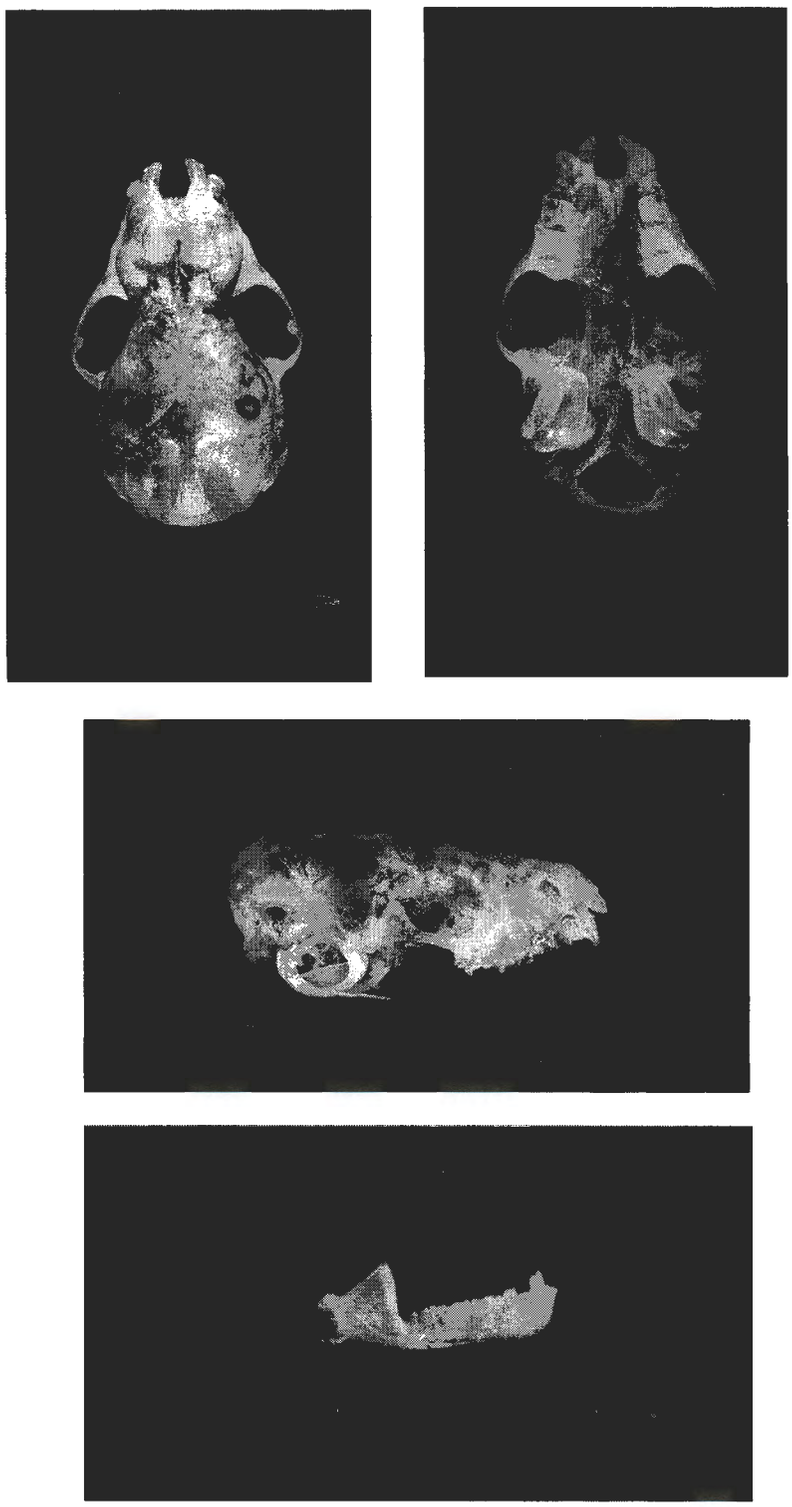


Figure 95. Skull and teeth of *Histiotus macrotus macrotus*. Bar = 1 cm. Teeth not to scale.

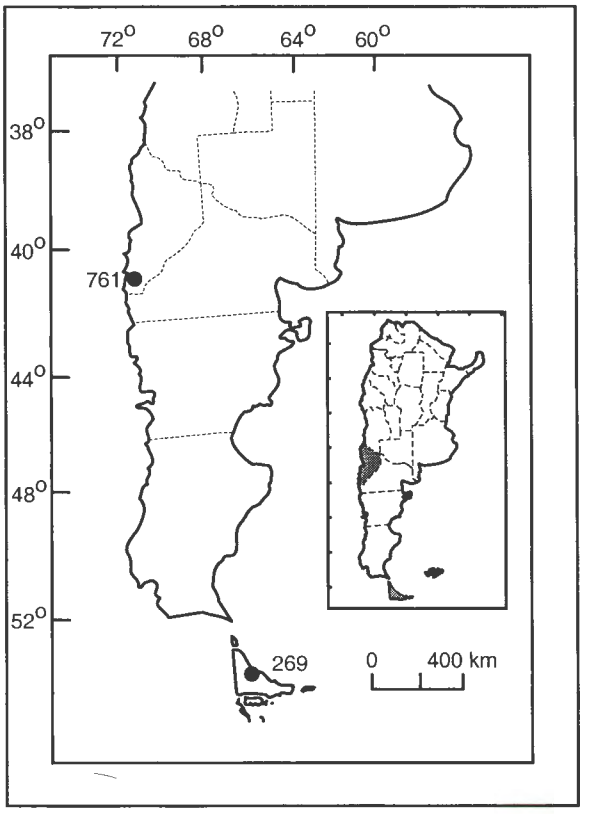


Figure 96. Map of the localities of *Histiotus magellanicus*.

Type Locality.— Straits of Magellan.

Distribution (Fig. 96).— *Histiotus magellanicus* is known only from southern Chile, Tierra del Fuego, and Neuquén Province. Cabrera (1958) reported it from southern Santa Cruz Province, but specimens examined from this area are *H. montanus*. Osgood (1943) listed this species as a subspecies of *H. montanus* (*H. montanus magellanicus*).

Few specimens of this subspecies are deposited in collections. We have only been able to examine five specimens, three that we collected in Neuquén Province in 1991. The specimen from Estancia Viamonte, Tierra del Fuego, Argentina (BM 30.10.9.1) is a young individual.

Description (Figs. 92b and 97).— Dorsal coloration is dark brown, with hairs darker at the base and lighter at the tip. Ventrally, the bases of the hairs are almost black, and the tips yellowish or creamish, contrasting strongly with the dark base. All membranes and ears are dark brown. The ears are well separated, without any trace of a connecting band, a character that clearly differentiates this species from all other species of *Histiotus* in Argentina. The tragus is well developed, slender, and almost one-half the length of the ear. The skull and teeth are similar to other species of the genus.

Measurements.— Table 13.

Comments.— The specimens from Neuquén Province were captured in the *Nothofagus* rain forest, along with *H. macrotus macrotus*, *Lasiurus varius*, and *Myotis chiloensis*. All individuals were adults, and one female was pregnant (one fetus = 19 mm CRL). The other two were males, one with large scrotal testes, in the summer month of December.

Specimens Examined (5).— NEUQUÉN: Villa La Angostura, 19 km N along Hwy. 234, 3 (1 CML, 1 IADIZA-CM, 1 OMNH). TIERRA DEL FUEGO: Estancia Viamonte, 1 (BMNH). NO SPECIFIC LOCALITY: Puerto Pratt, Last Hope Inlet, Patagonia, 5 m, 1 (BMNH).

Histiotus montanus (Philippi and Landbeck)

Vespertilio montanus Philippi and Landbeck, Archiv für Naturgeschichte, 27(1):289, 1861.

Histiotus montanus: Miller, Bulletin of the United States National Museum, 57:214, 1907.

Type Locality.— Chile, Cordillera de Santiago.

Distribution.— According to Koopman (1993), this species is distributed in a narrow strip that extends southward from western Venezuela and Colombia, through central Ecuador and Peru, to southwestern Bolivia, widening to include Argentina, Uruguay, and Chile. As discussed in the *H. macrotus* account, specimens examined that came from northwestern Argentina are not *H. montanus*; consequently, the idea that the distribution is continuous from north to south is not correct. A re-examination of specimens from other countries would help clarify the situation.

Distribution in Argentina.— Figure 98.

Description (Figs. 92c, 99a, and 100).— General appearance is similar to *H. macrotus macrotus*, but the size of the body and the length of the ears is less. In adults, the ratio of the length of the head and body and the length of the ear normally ranges between 2.3 and

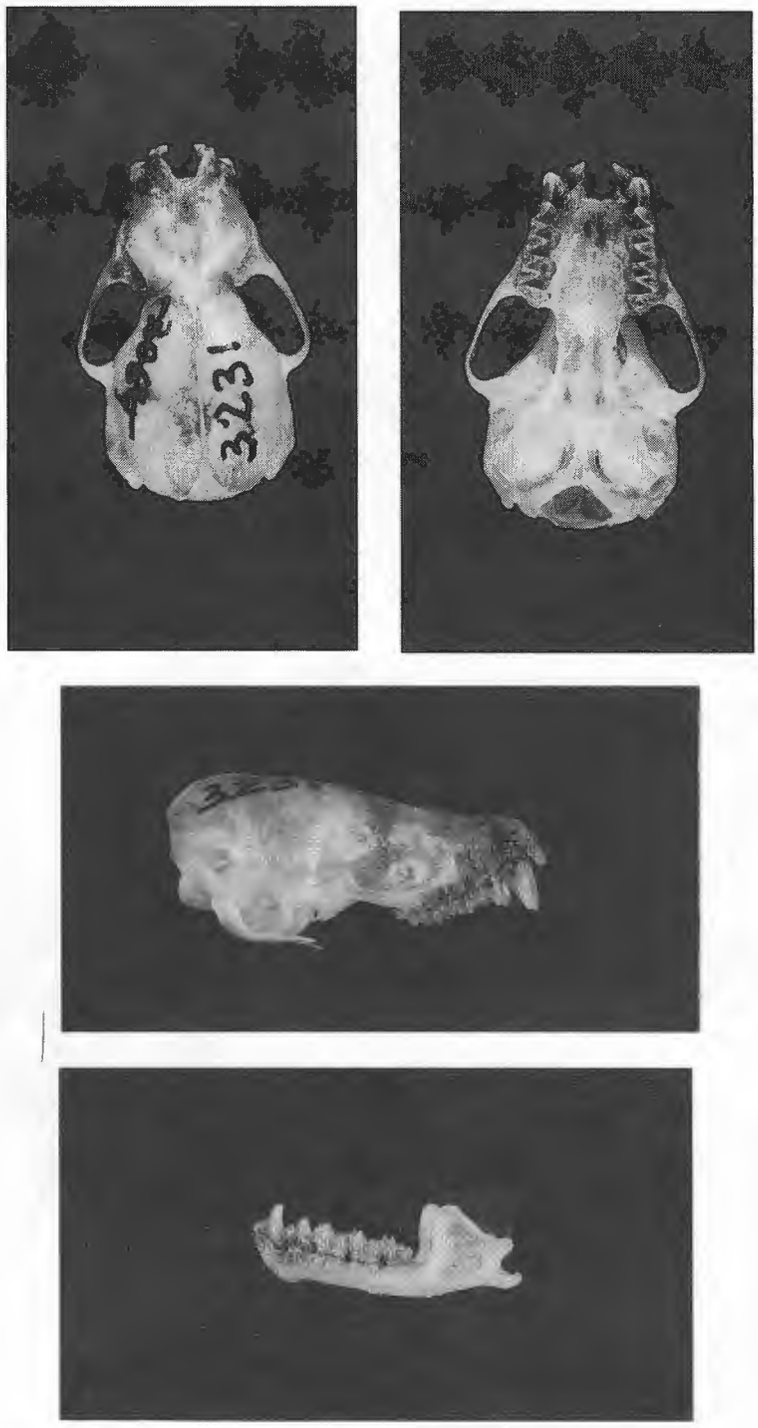
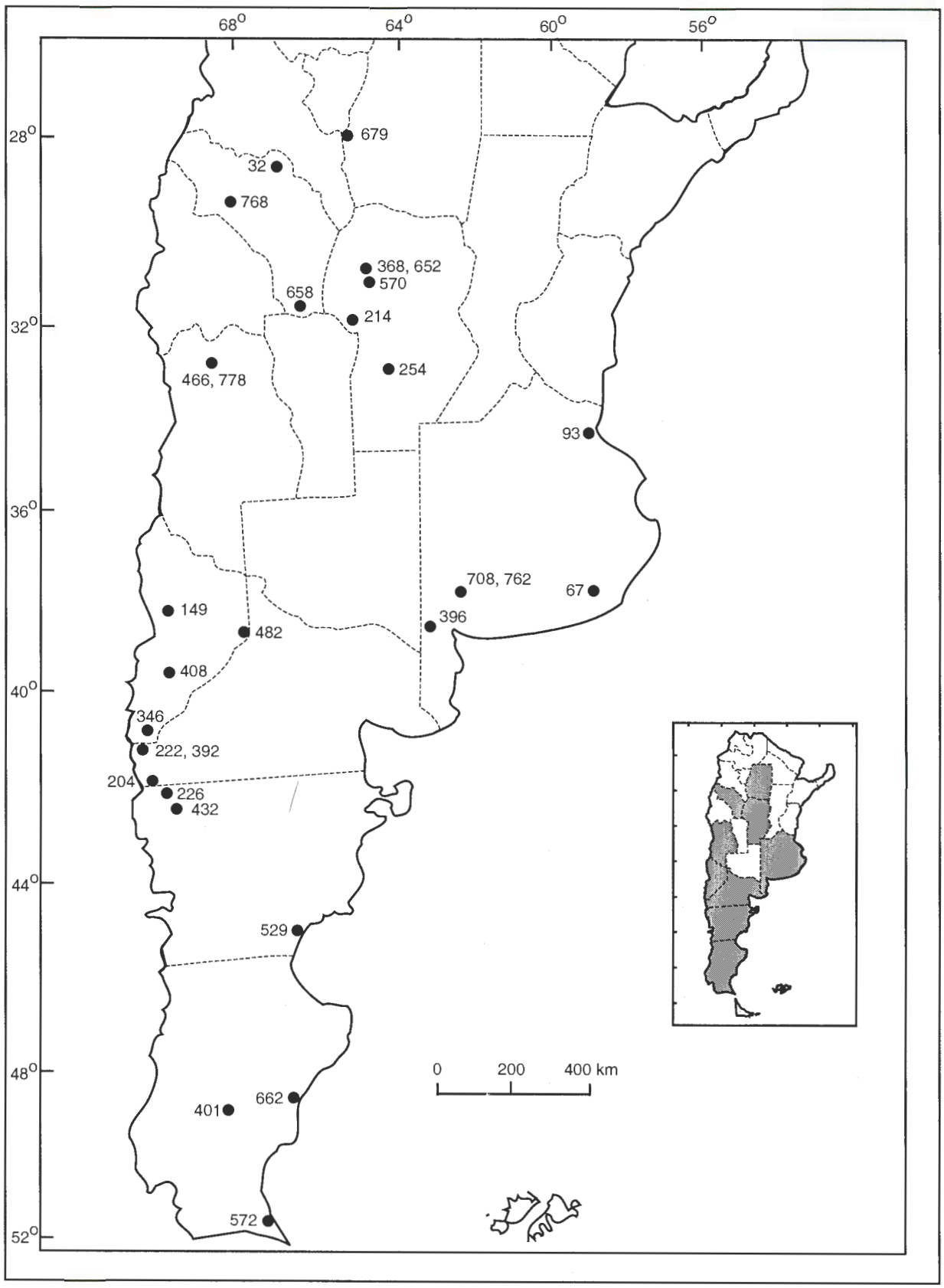


Figure 97. Skull and teeth of *Histiotus magellanicus*. Adult female from Villa La Angostura, Neuquén Province (CML 3231).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466, 778
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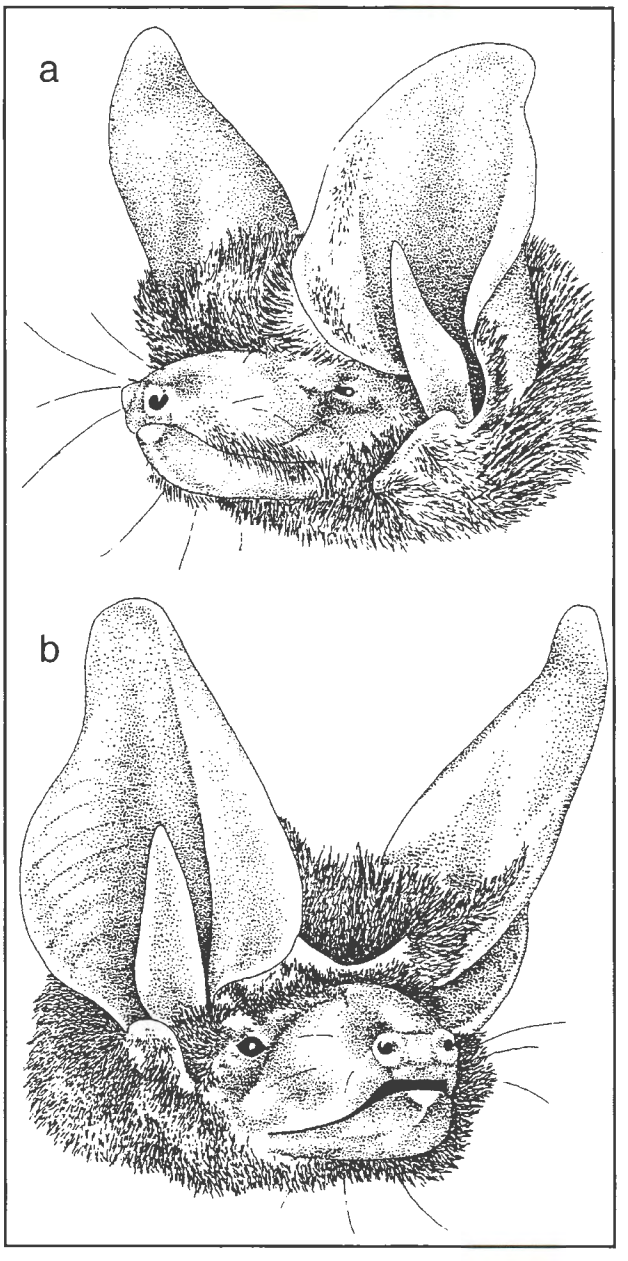


Figure 99. Face of: (a) *Histiotus montanus montanus* and (b) *Histiotus velatus*.

Figure 98. Map (facing page) of the localities of *Histiotus montanus montanus*.

3.1. The skull is similar to *H. macrotus*, but is smaller, and has smaller tympanic bullae that are less than 4.0 mm in length. Color is similar to *H. macrotus macrotus*, but the tips of the hairs of the venter are whiter in *H. montanus*. The band between the ears is normally absent, but may be present in some individuals. As is the case with the majority of characters of this and the other species of the genus, the extent of individual and geographic variation is unknown.

Measurements.— Table 13.

Comments.— Pearson and Pearson (1989) studied this species in western Patagonia. They found several roosts in the attics of houses. Reproductively active females (with full-term fetuses) were collected in early November and reproduction continued into at least December. The Pearsons estimated that females do not reproduce before one year of age. These bats are occasionally eaten by barn owls, *Tyto alba* (Massoia et al., 1993).

Specimens Examined (56).— BUENOS AIRES: Balcarce, 2 (MSU); Buenos Aires, 1 (BMNH); Sierra de la Ventana, 1 (MACN). CHUBUT: El Maitén, 2 km N, 1 (MVZ); Leleque, 7 (MVZ); Pico Salamanca, 1 (BMNH). CÓRDOBA: El Carrizal, Córdoba Range, 1000 m, 2 (BMNH); Espinillo, 2 (SUVM); La Cumbre, 1 (CML); Punilla, Valle Hermoso, 1 (TTU); San Esteban, 1100 m, 3 (1 CML, 2 OMNH). LA RIOJA: Aimogasta, 1 (MACN); San Isidro, 1 (MACN); Villa Unión, 5 (MACN). MENDOZA: Mendoza, 2 (1 BMNH, 1 MCZ); Zanjón Bermejo, 1 (MACN). NEUQUÉN: Codihué, 4 (MACN); Isla Victoria, 1 (CML); Neuquén, 2 (1 BMNH, 1 MACN). RÍO NEGRO: El Bolsón, 1 (MACN); El Cóndor, Lago Perito Moreno, 800 m, 1 (MVZ); Lago Perito Moreno, 1 (MVZ). SANTA CRUZ: Laguna Grande, 11 (MVZ); Punta Loyola, S. Patagonia, 1 (BMNH); San Julián, 1 (MACN). SANTIAGO DEL ESTERO: San Salvador, 1 (FCM).

Additional Records.— BUENOS AIRES: Laguna Chasicó (Contreras, 1973); Villa La Ventana (Massoia et al., 1993). CHUBUT: Golfo San José (Daciuk, 1977). NEUQUÉN: Las Coloradas, 1000 m (Fornes and Massoia, 1967). SANTIAGO DEL ESTERO: San Pedro de Guasayán (Romaña and Abalos, 1950).

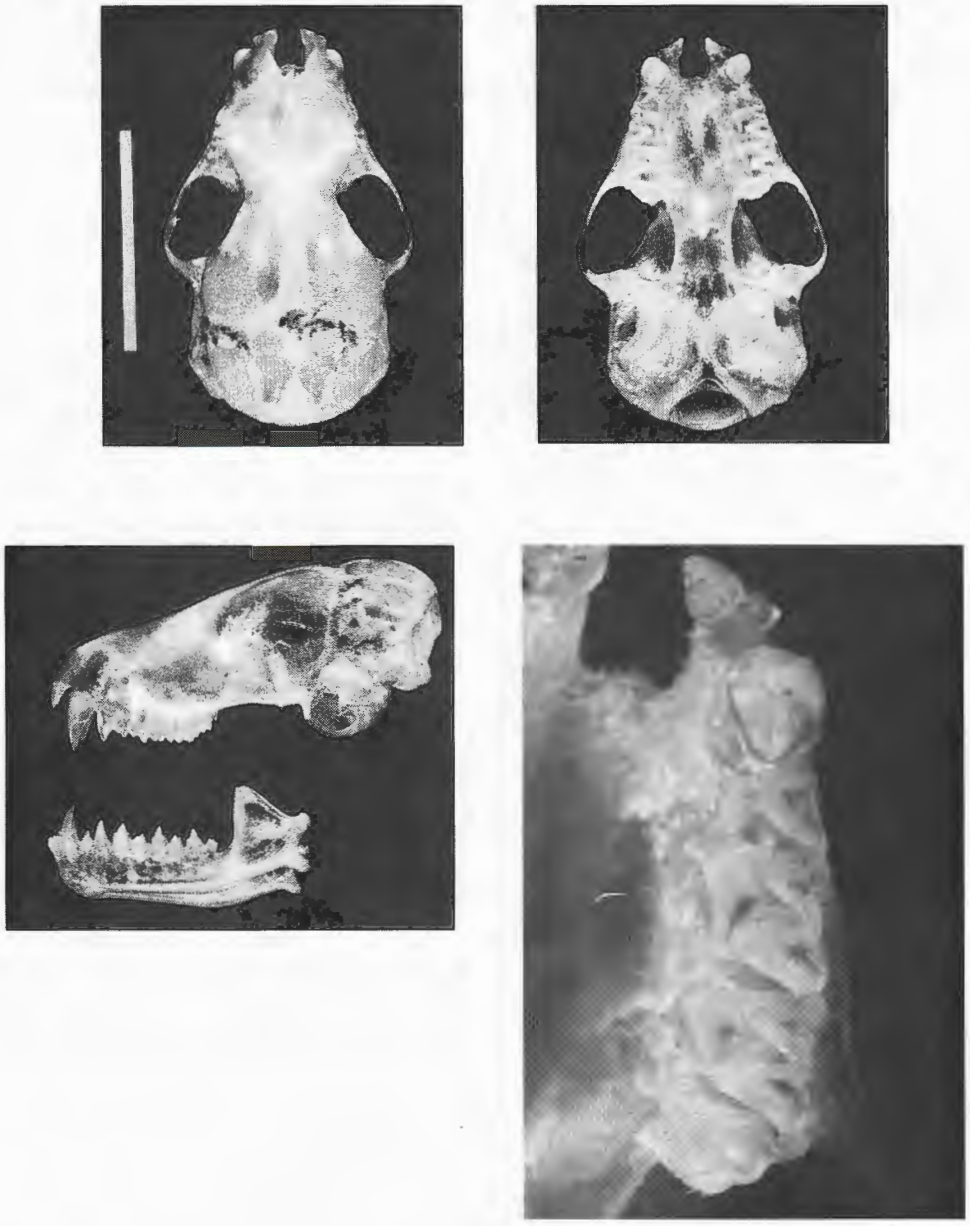


Figure 100. Skull and teeth of *Histiotus montanus montanus*. Adult male from San Esteban, Córdoba Province (OMNH 18984). Bar = 1 cm. Teeth not to scale.

Table 13. Measurements of Histiotus magellanicus, Histiotus montanus, *and* Histiotus velatus. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Histiotus magellanicus*	*Histiotus montanus*	*Histiotus velatus*
Total length	111.0 ± 14.14, 2 101.0 - 121.0	112.1 ± 5.41, 25 100.0 - 122.0	
Tail length	46.5 ± 9.19, 2 40.0 - 53.0	47.3 ± 3.67, 25 40.0 - 55.0	
Hindfoot length	9.5 ± 0.71, 2 9.0 - 10.0	10.2 ± 1.01, 25 8.0 - 12.0	
Ear length	22.5 ± 2.12, 2 21.0 - 24.0	25.7 ± 2.41, 25 20.0 - 29.5	
Forearm length	45.7 ± 1.84, 2 44.4 - 47.0	45.1 ± 1.63, 25 42.5 - 49.0	46.0, 1
Weight 16.0, 1	13.6 ± 2.84, 21 9.0 - 18.8		
Condylobasal length	17.2, 1 16.2 - 17.3	16.7 ± 0.33, 26	
Least interorbital breadth	5.25 ± 1.20, 2 4.4 - 6.1	6.2 ± 0.21, 26 5.9 - 6.6	
Zygomatic breadth	11.7, 1 10.5 - 12.3	11.2 ± 0.41, 25	
Greatest length of skull	17.8, 1 17.0 - 18.2	17.5 ± 0.35, 26	
Postorbital constriction	4.5, 1 4.2 - 4.8	4.4 ± 0.16, 26	
Breadth of braincase	8.4, 1 7.9 - 8.7	8.2 ± 0.20, 26	
Length of maxillary toothrow	6.45 ± 0.21, 2 6.3 - 6.6	6.3 ± 0.20, 26 5.9 - 6.8	
Palatal length	7.5, 1 7.5 - 8.8	8.1 0.31, 25	
Mastoidal breadth	9.5, 1 8.8 - 9.3	9.1 ± 0.15, 26	
Length of mandibular toothrow	7.1, 1 6.5 - 7.2	6.8 ± 0.18, 25	
Length of mandible	13.3 ± 0.14, 2 13.2 - 13.4	12.1 ± 0.30, 26 11.5 - 12.8	
C-C (width across canines)	5.2 ± 0.21, 2 5.0 - 5.3	4.9 ± 0.16, 26 4.6 - 5.3	
M-M (width across molars)	6.8 ± 0.28, 2 6.6 - 7.0	7.1 ± 0.24, 26 6.6 - 7.6	

Histiotus velatus (I. Geoffroy St.- Hilaire)

Plecotus velatus I. Geoffroy St.- Hilaire, Annales des Sciences Naturelles, Paris, 3:446, 1824.

Histiotus velatus: Gervais, Deuxième Mémoire. Documents zoologiques pour servir à la monographie des Chéiroptères Sud-Américains. Pp. 25-88, *in* P. Gervais, ed., Mammiféres. *In* Animaux nouveaux ou rares recueillis pendant l'expédition dans les parties centrales de l'Amérique du Sud, de Rio de Janeiro a Lima, et de Lima au Para; exécutée par ordre du gouvernement Français pendant les années 1843 à 1847, sous la direction du comte Francis de Castelnau (F. Castelnau, ed.). P. Bertrand, Paris, 1 (2):77, 1855 (1856).

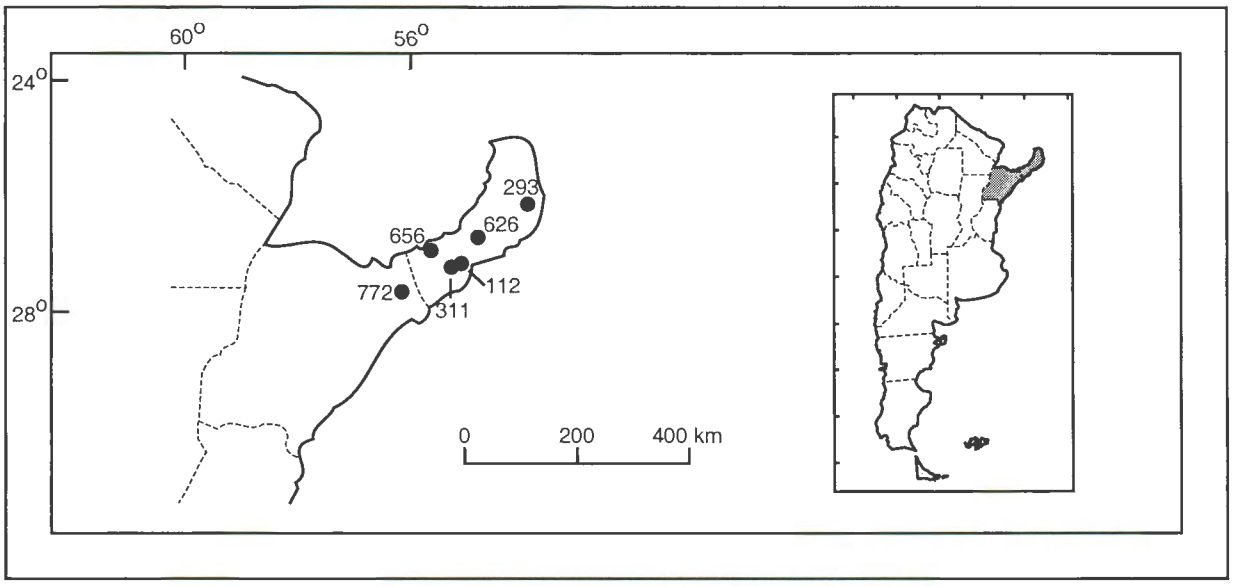


Figure 101. Map of the localities of *Histiotus velatus*.

Type Locality.— Brazil, Paraná, Curitiba.

Distribution (Fig. 101).— Currently, this species is restricted to Bolivia (Anderson, 1993), central and southern Brazil, southeastern Paraguay, and northeastern Argentina (Koopman, 1993), where it is only known from the provinces of Corrientes and Misiones.

Description (Figs. 92d and 99b).— Cabrera (1958) remarked that the figures of *Histiotus velatus* published by Gervais (1855) do not clearly present the characters of this species and he suggested that they may have been based on a specimen of *H. macrotus*. There is an error in the lack of an invagination on the upper outer margin of the ear, which is shown as almost continuous in the figure (Gervais, 1855: plate 13). In *H. velatus*, the ear is pointed, giving a triangular appearance. This shape is one of the few characters that can be used to differentiate *H. velatus* from *H. alienus* (in which the ears are rounded). Thomas (1916) agreed with Peters (1875) that *H. velatus* is readily distinguishable from other *Histiotus* by the triangular ear, the inner margin of which has a forward-projecting rounded lobe; the lobes of each ear are connected by a transverse band 3 mm in height. In addition to ear shape, *H. velatus* differs from other *Histiotus* by the dark coloration of both the hair and the membranes. Normally the transverse band between the ears is present (about 3 mm in height) but, as in the other species, this character may vary.

The skull is slightly narrower than in the other species, and the interorbital region and palate are narrower (Thomas, 1916), but these differences are subtle.

Measurements.— Table 13.

Comments.— The biology of this species is almost unknown. It is known to be preyed upon by Stygian owls (*Asio stygius*) in the cerrado savanna of Brazil (Motta Junior and Taddei, 1992).

Specimens Examined (3).— MISIONES: Frontera, Tobuna, 1 (MACN); Guaraní, 1 (CEM); San Ignacio, 1 (MACN).

Additional Records.— CORRIENTES: Virasoro (Vaccaro, 1992). MISIONES: Campo Ramón (Vaccaro, 1992); Río Victoria (Massoia, 1980).

Genus *Dasypterus*

Dasypterus has long been recognized as a genus separate from *Lasiurus* (e.g., Miller, 1907). The dental formula in *Dasypterus* is generally I 1/3, C 1/1, P 1/2, M 3/3, total 30, whereas in *Lasiurus* it is I 1/3, C 1/1, P 2/2, M 3/3, total 32. In *D. ega*, the proximal one-half of the uropatagium is furred. The ears are small and rounded. It has only one upper premolar on each side. It lacks the frosting on the pelage that characterizes almost all species of *Lasiurus*, and only the proximal one-

half of the uropatagium is furred. *Dasypterus* has been treated variously as a genus or subgenus of *Lasiurus* (e.g., Corbet and Hill, 1991; Kurta and Lehr, 1995). We recognize *Dasypterus* as a genus separate from *Lasiurus*, based on morphological differences, as have Cabrera (1958), Husson (1962, 1978), and others.

Dasypterus ega (Gervais)

Nycticeius ega Gervais, Deuxième Mémoire. Documents zoologiques pour servir à la monographie des Chéiroptères Sud-Américains. Pp. 25-88, *in* P. Gervais, ed., Mammiféres. *In* Animaux nouveaux ou rares recueillis pendant l'expédition dans les parties centrales de l'Amérique du Sud, de Rio de Janeiro a Lima, et de Lima au Para; exécutée par ordre du gouvernement Français pendant les années 1843 à 1847, sous la direction du comte Francis de Castelnau (F. Castelnau, ed.). P. Bertrand, Paris, 1 (2):77, 1855 (1856).

Dasypterus ega xanthinus: Thomas, Annals and Magazine of Natural History, Sixth Series, 20:544, 1897.

Type Locality.— Brazil, Amazonas, Ega.

Distribution in South America.— Widely distributed in South America, but apparently absent west of the Andes of Peru, Bolivia, Argentina, and in all of Chile. The taxonomy of the different subspecies is unclear, although Handley (1960) recognized five. We recognize only one for Argentina (Kurta and Lehr, 1995); we found no significant differences between specimens from northwestern and northeastern Argentina.

Dasypterus ega caudatus (Tomes)

Lasiurus caudatus Tomes, Proceedings of the Zoological Society of London, 25:42, 1857.

Type Locality.— Pernambuco, Brazil.

Distribution in Argentina.— Figure 102.

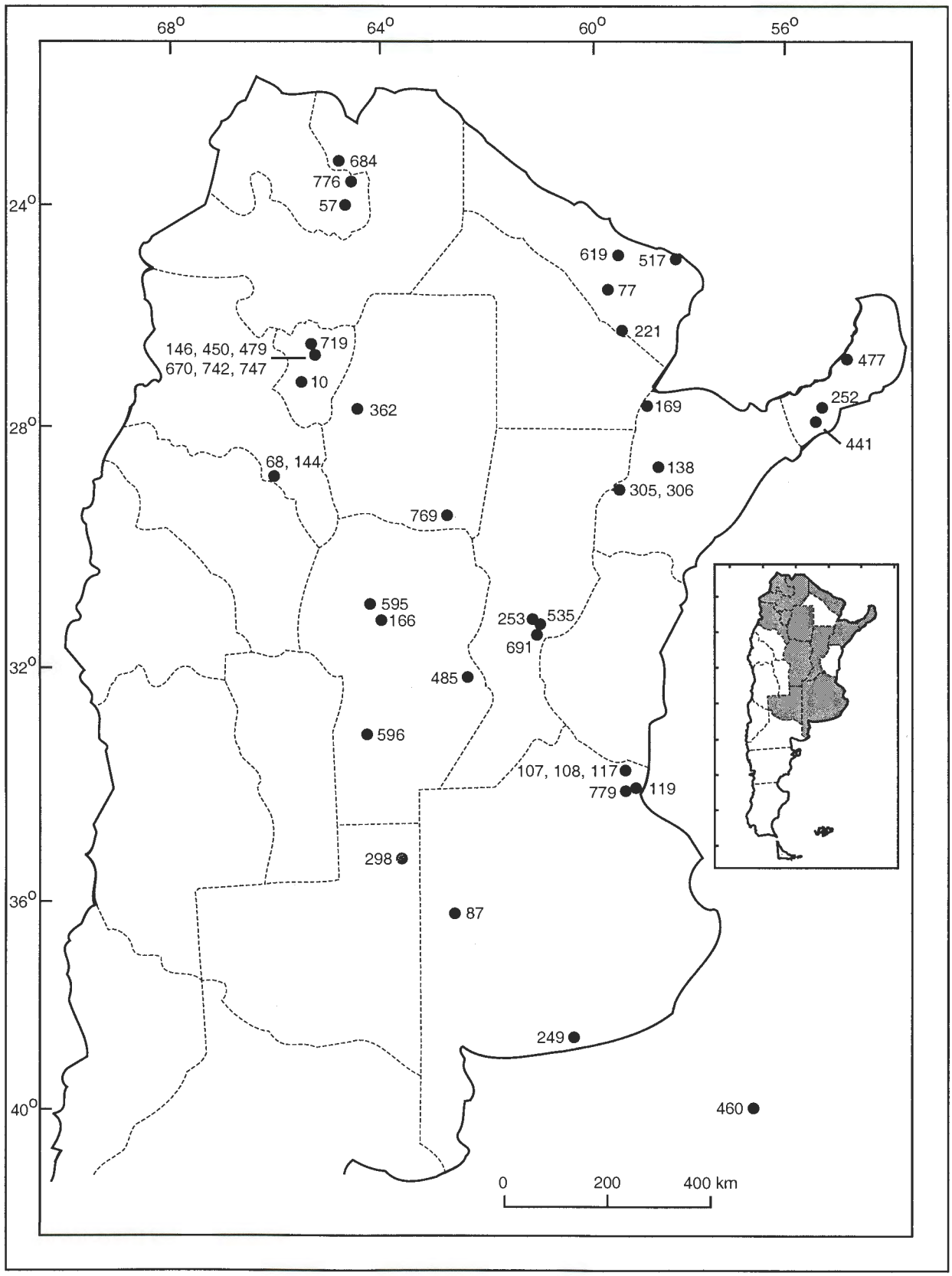
Description (Figs. 103a, 103b, 103c, and 104).— The general appearance of this species is similar to the species of *Lasiurus*, but it is easily recognized by its yellowish olive coloration and partially haired uropatagium. Body size is similar to *L. cinereus*, but the forearm is less than 50 mm. Hairs of both the dorsum and ventrum have dark, almost black or brown, bases and olivaceous or yellowish tips, which gives a uniform, not frosted, appearance. The venter is paler. The wing membranes are light brown and the edges of the plagiopatagium are generally white. Dorsally, the membranes are naked and hairs are abundant only over the proximal one-half of the uropatagium and along the sides of the body. Ventrally, hairs extend over the plagiopatagium to the sides of the body and along the posterior edge of the forearm to the fifth finger, but never as extensive as in *L. cinereus*; some isolated hairs can be observed on the propatagium and at the base of the uropatagium. The ears are small, rounded, and the anterointernal margin fringed with yellowish hairs. The tragus is wide, its length slightly longer than one-half the height of the ear. The tail is short, not longer than one-half the length of the head and body.

The dental formula is I 1/3, C 1/1, P 1-2/2, M 3/3, total 30-32. Skull shape is similar to *L. cinereus*, but distinguishable by the usual absence of P1, by the shorter rostrum and palate, and by the postorbital constriction that is narrower in *D. ega* than in *L. cinereus*. These characters are difficult to appreciate if skulls of the two species are not being compared.

Measurements.— Table 14.

Comments.— This species is not well known, although its biology is summarized by Kurta and Lehr (1995). Goodwin and Greenhall (1961) suggested that its habits are similar to *L. borealis*. Acosta y Lara (1950), Fornes and Massoia (1967), and Crespo (1974), mentioned capturing single individuals and groups of up to 20 individuals among the leaves of palm trees. We also observed them between the leaves of cultivated palms in the city of Tucumán and in vineyards in Formosa Province. Some specimens obtained by J. R. Contreras (personal communication), were hanging between the leaves of a Yatay palm, in Chavarría, Corrientes. Villa-R. and Villa-C. (1971) captured them in roofs constructed of palms or straw in Jujuy. This species is known to be preyed upon by stygian owls (*Asio stygius*) in the cerrado savanna of Brazil (Motta Junior and Taddei, 1992), and by barn owls (*Tyto alba*) in the provinces of Buenos Aires (Massoia et al., 1989), and Misiones (Massoia et al., 1989*b*).

Geographic variation and sexual dimorphism have been reported for this species. Myers and Wetzel (1983) found that specimens from the Chaco were smaller than those from east of the Andes. Willig (1983) noted a tendency for females to be larger than males, but the dif-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305, 306
769
595
166
253
535
691
485
596
107, 108, 117
779
119
298
87
249
460
0
200
400 km

ference was not sufficiently significant to be considered as sexual dimorphism. Females have four mammae, and generally give birth to more than two young. The only known reproductive data for this species in Argentina are a newborn captured in Zelaya, Buenos Aires, at the end of January and a male with scrotal testes from Tucumán, Ciudad, captured during the middle of June. Thomas (1901*a*) described the subspecies *D. e. argentinus* from Argentina, and the name has disappeared in synonymy with *D. e. caudatus*, assuming only one subspecies is involved between Argentina (*argentinus*) and Pernambuco, Brazil (*caudatus*). We have not examined sufficient material to resolve this question, so have therefore retained *D. e. caudatus* for the material from Argentina.

Specimens Examined (41).— BUENOS AIRES: Bonifacio, F. C. Sud, 1 (BMNH); Campana, INTA, 1 (TCWC); Capital Federal, 1 (MACN); Paraná de Las Palmas, 1 (TCWC); Zelaya, 1 (MACN). CATAMARCA: Balneario El Caolín, 6 km NW Chumbicha, 5 (OMNH). CÓRDOBA: Córdoba, 1 (MSB); Noetinger, E Córdoba, 100 m, 1 (BMNH). CORRIENTES: Chavarría, 1 (OMNH); Corrientes, 2 (CML); Goya, 4 (1 BMNH, 3 OMNH); Goya, 600 m, 1 (BMNH). FORMOSA: Río Porteño, 5 km S Estancia Santa Catalina, 1 (CML). JUJUY: Yuto, 2 (1 AMNH, 1 FCM). MISIONES: Montecarlo, 1 (FMNH). SALTA: San Ramón de la Nueva Orán, 1 (MACN). SANTA FE: Esperanza, 3 (BMNH); Piquete, 1 (MACN); Santa Fe, 1 (MFA). TUCUMÁN: Acheral, 1 (CML); Ciudad Capital, 1 (OMNH); Los Vásquez, 445 m, 2 (BMNH); San Miguel de Tucumán, 3 (1 BMNH, 2 CML); Tafí Viejo, 1 (CML); Tucumán, 1 (FMNH); Tucumán, ciudad, 1 (CML). Mar Argentino (40° 04.5' S 56° 21.5' W), 1 (AMNH).

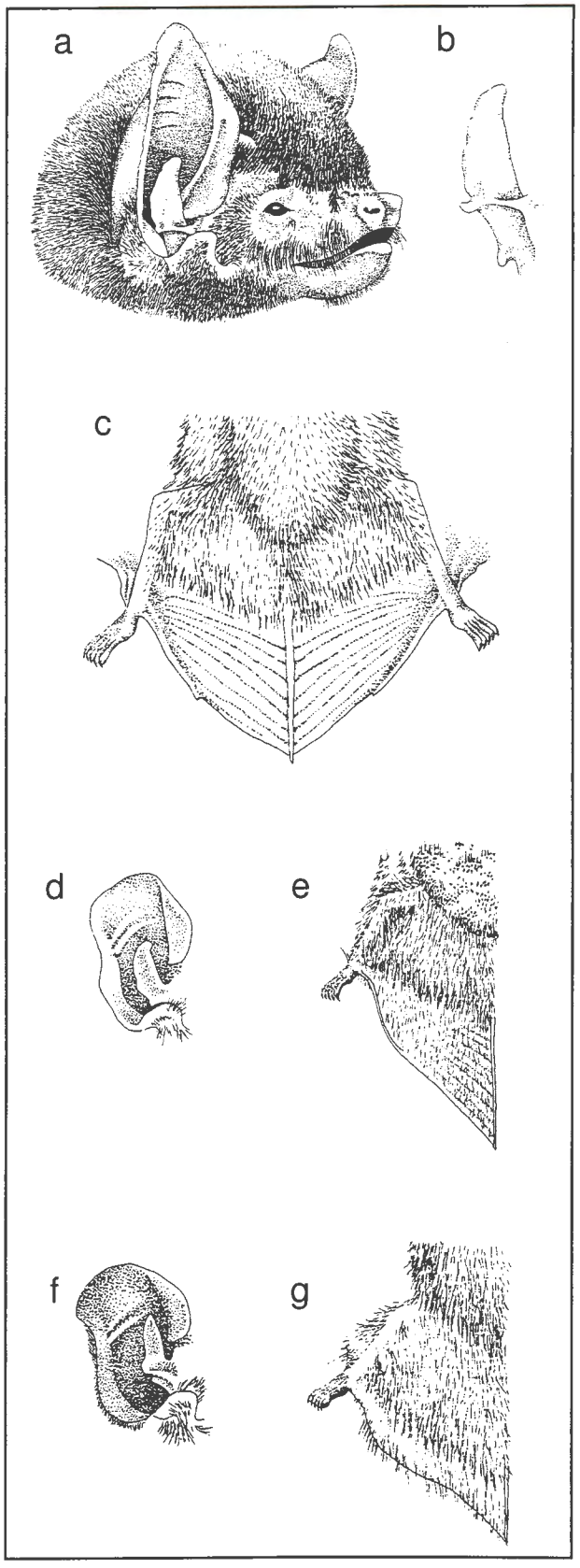
Additional Records.— BUENOS AIRES: Campana (Barquez, 1987); Canal 6, Delta bonaerense (Massoia et al., 1989); Delta del Paraná (Fornes and Massoia, 1967); Energía (Crespo, 1974). CATAMARCA: Chumbicha, 7 km al N (Barquez and Lougheed, 1990). CÓRDOBA: Río Ceballos (Wainberg and De Rosa, 1966); Río Cuarto (Tiranti and Torres, 1998). FORMOSA: Bartolomé de Las Casas (Massoia, 1970); El Colorado (Massoia, 1970); Parque Nacional Río Pilcomayo, (S. Heinonen F. and R. M. Barquez, in litt.). JUJUY: Arroyo La Urbana, 45 km E y 5.4 km SE San Salvador de Jujuy, 620 m (Villa-R. and Villa-C., 1971). LA PAMPA: General Pico (Crespo, 1974). MISIONES: Departamento Cainguás (Massoia, 1980); Departamento Capital (Massoia, 1980); Escuela Provincial 639, Campo Ramón (Massoia, 1988*a*); Los Helechos, Escuela nº 12 (Massoia et al., 1989*b*). SANTIAGO DEL ESTERO: La Banda (Romaña and Abalos, 1950); Villa Unión (Romaña and Abalos, 1950). TUCUMÁN: Muñecas (Romaña and Abalos, 1950); Tucumán (Romaña and Abalos, 1950).

Figure 102. Map (facing page) of the localities of *Dasyperus ega*.

Genus *Lasiurus*

Hall (1981) discusses the propriety of the name *Lasiurus* versus *Nycteris* for members of this genus, and the historical reasons involved in the genus *Lasiurus* being given to the North American species of *Nycteris*. Hall's comments notwithstanding, most mammalogists recognize *Lasiurus* as the correct name for lasiurine bats not included in the genus (or subgenus) *Dasypterus* (e.g., Baker et al., 1988). We use the generic name *Lasiurus* in this report. Species in this genus can be distinguished from the other Argentine vespertilionids by the presence of a uropatagium that is fur-covered on the dorsal side with the hairs extending to the distal margin (in *D. ega* only the proximal one-half of the uropatagium is furred). The ears are small and rounded. The dental formula is I 1/3, C 1/1, P 2/2, M 3/3, total 32. Three species occur in Argentina and are easily differentiated by size and color. *L. cinereus* is the largest, with a forearm usually greater than 50 mm, two upper premolars on each side, and a markedly frosted coloration. The other two species are smaller. The frosted appearance of *L. blossevillii* is similar to *L. cinereus*, but the former is smaller (forearm < 42 mm). *Lasiurus varius* has a forearm length similar to *L. blossevillii*, but is very red in color and is not frosted.

Thomas (1902) described *L. borealis salinae* from Cruz del Eje, Córdoba. We have examined the type specimen at the BMNH (BMNH 2.2.5.39). The type is darker in color than most of the *L. blossevillii* examined, although this is difficult to see as the specimen is preserved in alcohol. The skull is slightly more robust, but this may be due to individual variation. A specimen from Los Vázquez, Tucumán, (BMNH 3.6.6.3), collected by L. Dinelli, was prepared and identified by Thomas on the skin tag as *L. salinae*. Apparently Tho-



mas considered *L. salinae* a distinct species based on the new locality. But the specimen from Tucumán is a young individual of *L. blossevillii* (with cartilaginous phalanges). Mares et al. (1995) recognized *L. salinae* as a distinct species after collecting specimens that were apparently *L. salinae* in the same mist net with others that were clearly *L. blossevillii*. Morales and Bickham (1995), in an analysis of mtRNA of *L. blossevillii* from Catamarca and San Juan provinces (the San Juan specimen being one we had identified as *L. salinae*) found only a single haplotype for *L. blossevillii*, suggesting that *L. salinae* and *L. blossevillii* are conspecific. We therefore conclude that specimens that we have captured that were identified as *L. salinae* are likely due to a color morph of *L. blossevillii*. *L. blossevillii* and *L. salinae* would therefore be synonymous. Cabrera (1958) and Shump and Shump (1982a) proposed that *L. salinae* was synonymous with both *L. borealis blossevillii* (= *L. blossevillii*) and with *L. borealis varius*. Cabrera (1958) considered individuals from western Córdoba southward to Río Negro and Chubut as belonging to the subspecies *L. b. varius*. Shump and Shump's (1982*a*) results are confusing, however. They synonymized *L. salinae* with *L. varius*, but did not include the type locality of *L. salinae* in the distribution of *L. varius*. Many authors erroneously treated specimens of *L. borealis* (=*L. blossevillii*) from northwestern Argentina as *L. b. varius* because many *L. borealis* exhibit a red color phase. We recognize *L. varius* as a valid species (Barquez et al., 1993).

Lasiurus blossevillii (Lesson and Garnot)

Vespertilio blossevillii Lesson and Garnot, Bulletin des Sciences Naturelles et de Géologie, 8:95, 1826.

Lasiurus blossevillii: Baker et al., Occasional Papers, The Museum, Texas Tech University, 117:8, 1988.

Type Locality.— Uruguay, Montevideo.

Distribution.— This species is found from the western United States throughout much of South

Figure 103. *Dasypterus ega* (a, b, and c), *Lasiurus blossevillii* (d and e), and *Lasiurus varius* (f and g): (a) face, lateral view; (b) tragus; (c) uropatagium; (d and f) ear; and (e and g) uropatagium.

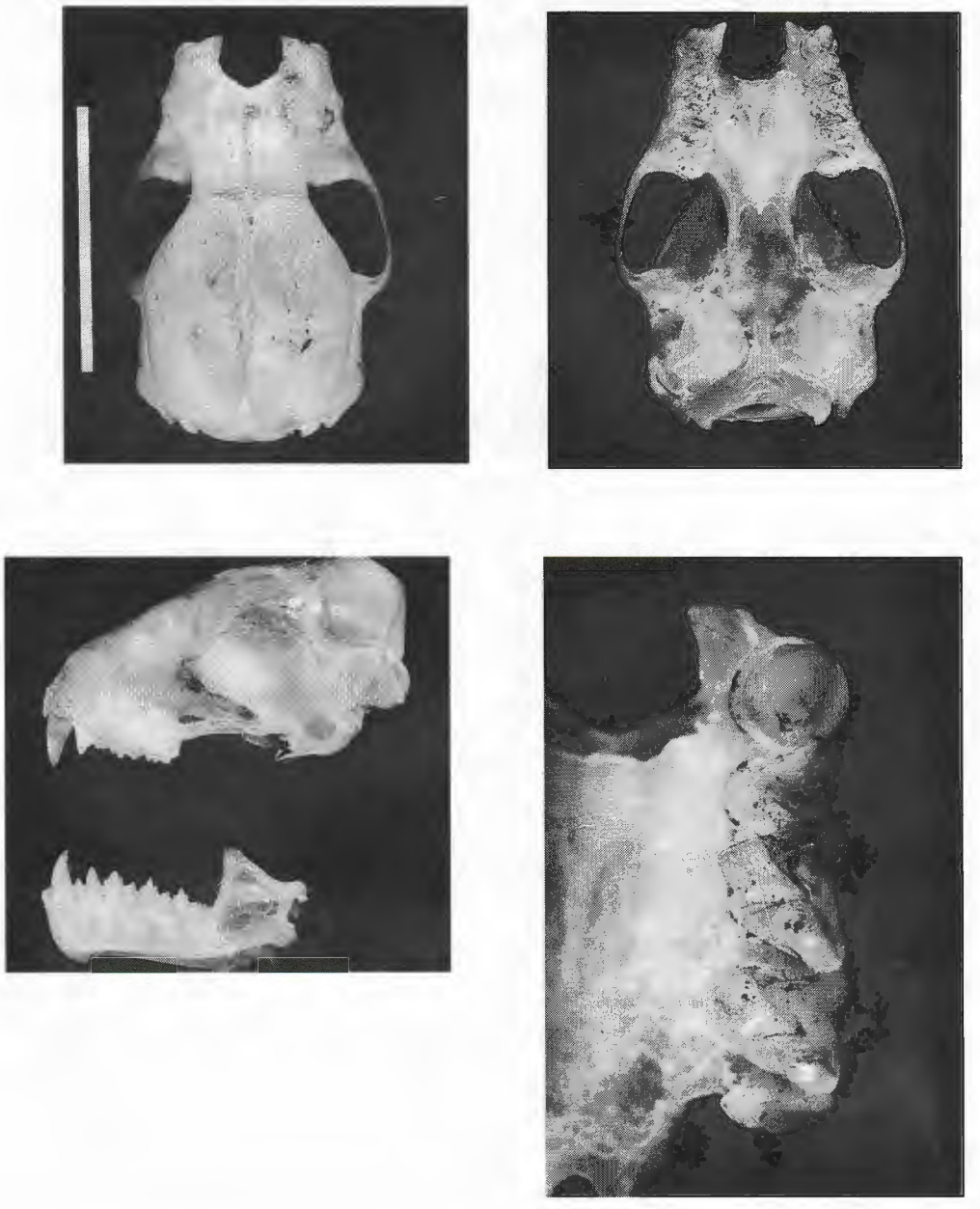


Figure 104. Skull and teeth of *Dasypterus ega*. Adult male from San Miguel de Tucumán, Tucumán Province (OMNH 18675). Bar = 1 cm. Teeth not to scale.

Table 14. Measurements of Dasypterus ega *and* Lasiurus blossevillii. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Dasypterus ega*	*Lasiurus blossevillii*
Total length	120.5 ± 8.02, 11 106.0 - 132.0	100.6 ± 5.65, 10 92.0 - 112.0
Tail length	55.7 ± 7.04, 11 43.0 - 68.0	47.9 ± 2.77, 10 44.5 - 52.0
Hindfoot length	9.2 ± 2.24, 10 6.0 - 11.5	8.0 ± 0.75, 8 7.0 - 9.0
Ear length	17.1 ± 2.20, 11 14.0 - 20.0	10.3 ± 1.16, 10 8.0 - 11.6
Forearm length	47.0 ± 2.38, 13 43.2 - 51.0	39.3 ± 1.22, 12 37.7 - 41.3
Weight	15.3 ± 2.75, 6 13.0 - 20.0	8.2 ± 1.36, 6 6.0 - 10.0
Condylobasal length	15.1 ± 0.48, 12 14.3 - 16.0	11.1 ± 0.47, 10 10.3 - 11.8
Least interorbital breadth	6.6 ± 0.21, 12 6.3 - 7.1	5.3 ± 0.18, 11 4.9 - 5.5
Zygomatic breadth	11.2 ± 0.30, 12 10.7 - 11.8	8.7 ± 0.38, 7 8.3 - 9.4
Greatest length of skull	15.7 ± 0.66, 12 14.5 - 17.0	11.8 ± 0.38, 10 11.3 - 12.5
Postorbital constriction	4.6 ± 0.12, 12 4.4 - 4.9	4.2 ± 0.14, 11 4.1 - 4.5
Breadth of braincase	8.4 ± 0.40, 12 7.3 - 8.7	7.3 ± 0.38, 11 6.6 - 7.8
Length of maxillary toothrow	5.6 ± 0.24, 12 5.1 - 6.1	3.9 ± 0.14, 11 3.6 - 4.1
Palatal length	6.3 ± 0.41, 10 5.7 - 7.1	4.8 ± 0.26, 7 4.4 - 5.0
Mastoidal breadth	9.0 ± 0.39, 12 8.1 - 9.5	7.4 ± 0.22, 10 7.1 - 7.9
Length of mandibular toothrow	6.4 ± 0.32, 12 5.8 - 6.9	4.6 ± 0.10, 10 4.5 - 4.8
Length of mandible	11.9 ± 0.59, 12 10.7 - 12.8	8.7 ± 0.29, 9 8.4 - 9.4
C-C (width across canines)	6.1 ± 0.18, 12 5.9 - 6.5	4.4 ± 0.18, 10 4.1 - 4.7
M-M (width across molars)	7.3 ± 0.23, 12 6.9 - 7.8	5.3 ± 0.28, 11 4.9 - 5.7

America, except southern Peru, Chile, and southwestern Bolivia. Baker et al. (1988) showed that *L. blossevillii* in the western United States, Mexico, and Venezuela was distinct from *L. borealis* (see also Genoways and Baker, 1988). Morales and Bickham (1995) utilized molecular analyses to show that *L. blossevillii* in North and South America are likely the same species, and distinct from *L. borealis*. They also suggested the possibility that the northern form, *L. b. frantzii* (Handley, 1960) from the United States, Mexico, Central America, and northern South America, and the southern South American form, *L. b. blossevillii*, could prove to be different species, rather than subspecies. According to Shump and Shump (1982*a*), this species is absent from northeastern Brazil and from southeastern Buenos Aires Province, Argentina, southward. Only one subspecies, *L. b. blossevillii*, is found in South America.

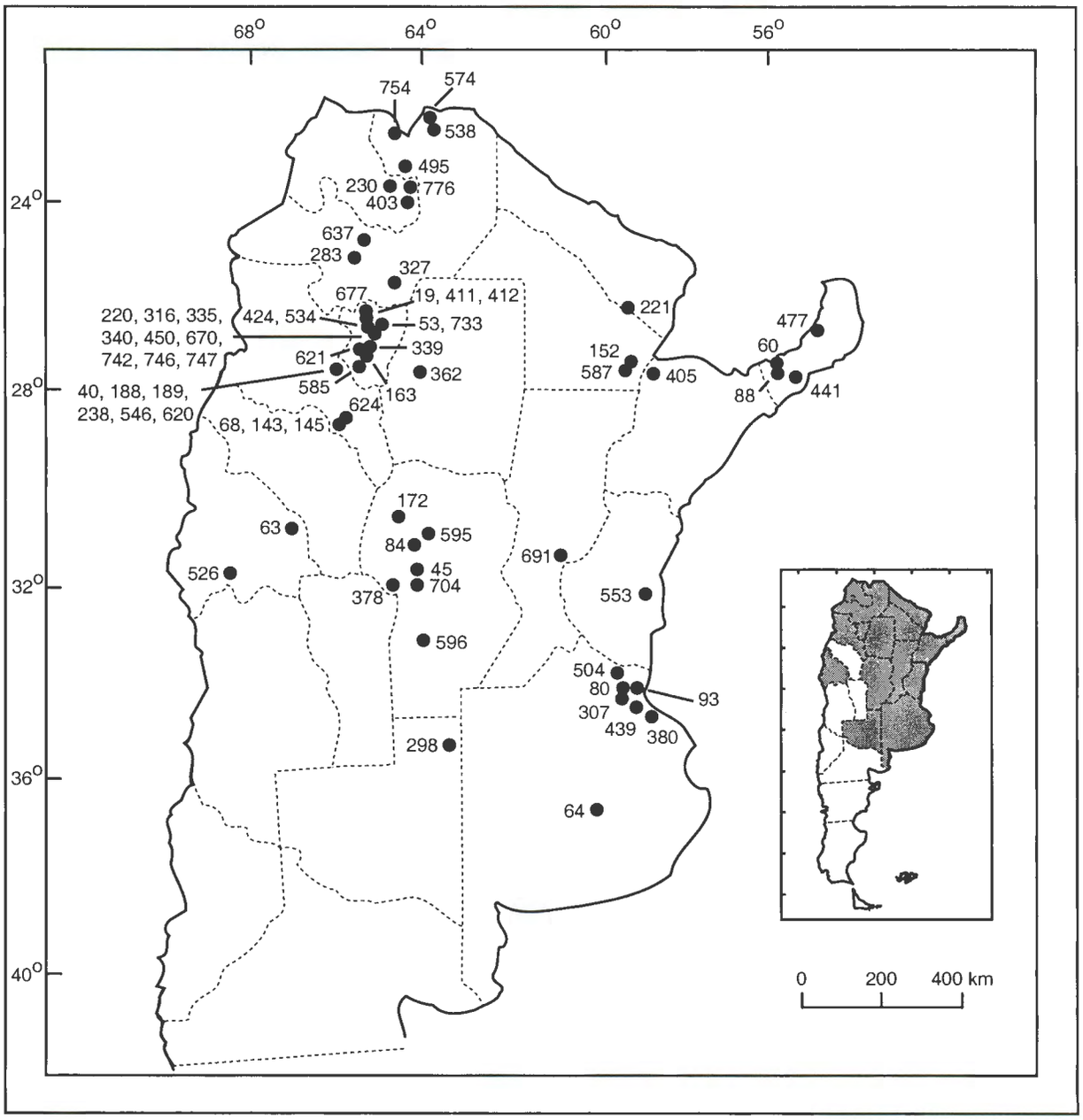


Figure 105. Map of the localities of *Lasiurus blossevillii.*

Lasiurus blossevillii blossevillii
(Lesson and Garnot)

Vespertilio blossevillii Lesson and Garnot, Bulletin des Sciences Naturelles et de Géologie, 8:95, 1826.

Lasiurus borealis blossevillii: Cabrera, Revista del Centro de Estudios Agronómicos y Veterinarios, Buenos Aires, 23:435, 1930.

Type Locality.— Uruguay, Montevideo.

Distribution in Argentina.— Figure 105.

Description (Figs. 103d, 103e, and 106).— Size is medium for a bat, but it is the smallest species in the genus, with a length of forearm between 37.7 and 41.3 mm in the specimens examined. The muzzle is short; the ears are small and rounded; the tragus is short, wider

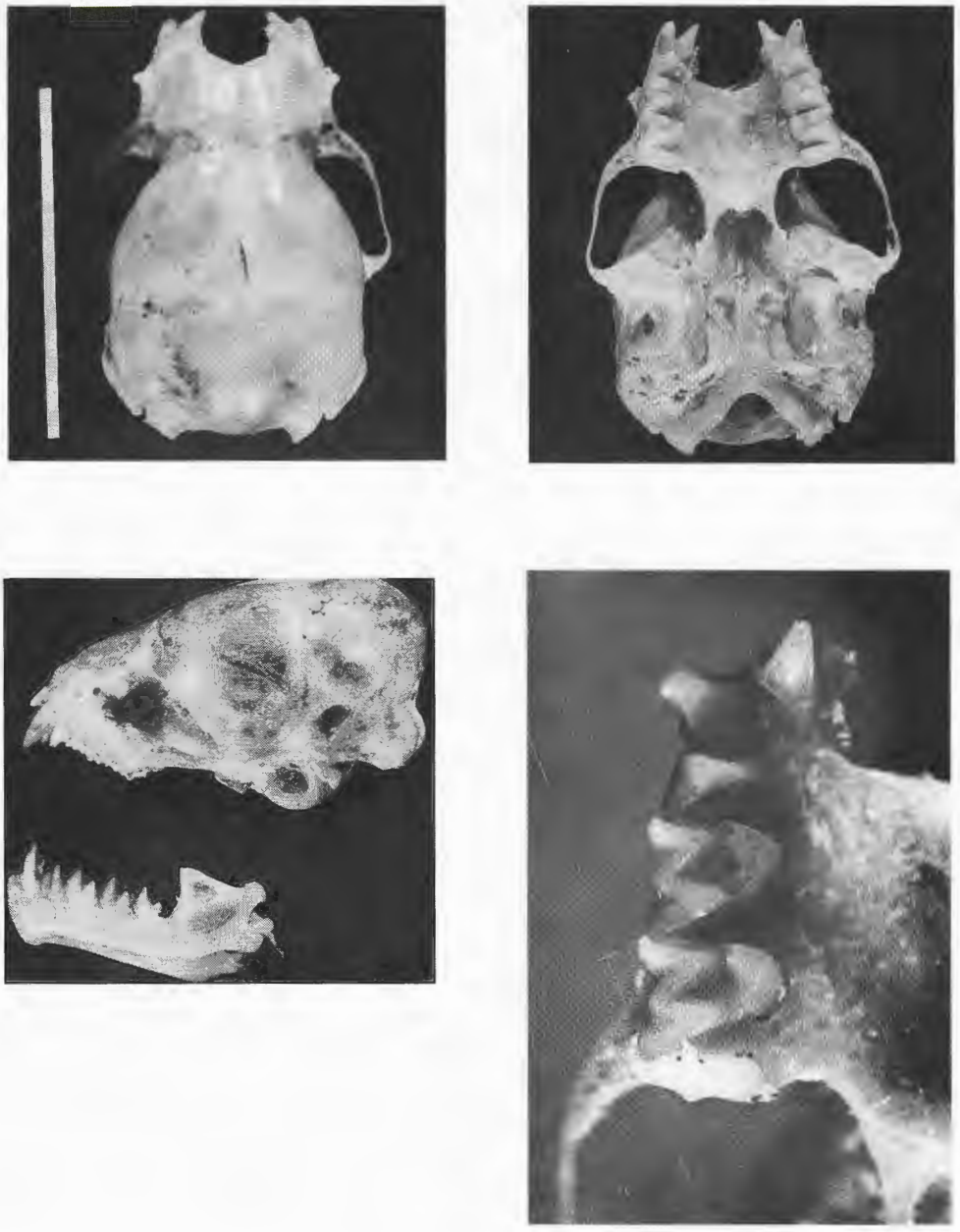


Figure 106. Skull of teeth of *Lasiurus blossevillii*. Adult female from Vado de Arrazayal, Salta Province (OMNH 18668). Bar = 1 cm. Teeth not to scale.

at the base than the tip, and the tip is rounded. Fur completely covers the uropatagium, except at the posterior border where the hairs are sparse; fur also covers the sides of the body, the plagiopatagium, and the legs. Ventrally, hair does not extend beyond the proximal one-half of the uropatagium; hair borders the body along the plagiopatagium, over the proximal one-half of the forearm, and where the third, fourth, and fifth phalanges come together; ventrally the legs are not covered with hair. Color is variable, but usually includes tones of brown and gray washed in reddish; some specimens exhibit a strongly reddish phase that may be confused with *L. varius*. The dorsum of *L. blossevillii* has many white-tipped hairs that give it a frosted appearance similar to *L. cinereus*. A typical dorsal hair has five color bands. The small basal band, about 1 to 2 mm, that is black. The second band is wider, about 4 mm, and usually is yellowish; this band gradually transitions toward a cinnamon band of about 2 mm. The fourth band is the dark brown tip. The fifth color band on many hairs is white or ash gray and gives the frosted appearance. Coloration and band width vary between individuals and populations; the widths given above are approximations. Coloration and band width also vary according to the area of the body. On the uropatagium, the hairs are usually bicolored. Ventrally, in the neck region, the hairs are similar to those of the dorsum. Toward the chest the dark basal band is wider and the yellow band reduced so that both are similar in width. On the abdomen the hairs are almost bicolored—the bases dark and the tips cream, yellow, or gray. The wing membranes are blackish brown with pale margins.

The dental formula is I 1/3, C 1/1, P 2/2, M 3/3, total 32. The skull is similar to other *Lasiurus*. *L. blossevillii* differs from *L. varius* mainly in proportions; *blossevillii* has a rostrum that is shorter and less robust than that of *varius*.

Measurements.— Table 14.

Comments.— Shump and Shump (1982*a*) summarized many aspects of the biology of this species (which was included in *L. borealis*). Most authors believe it to be a solitary species, although Acosta y Lara (1950) reported large groups in Uruguay that appeared during March and disappeared in April. Primary roosts are tree branches where the bats hang between the leaves. The reduction in ear size and the dense covering of hair on the uropatagium have been suggested as increasing the resistance to temperature changes and avoiding heat loss by increasing insulation. Kunz (1982) indicated that the long, soft, woolly pelage of *Lasiurus* is characteristic of species that do not roost in caves.

In North America, the gestation period is about 90 days and an individual can bear up to four young (Shump and Shump, 1982*a*). Data on reproduction are scarce for Argentina. A very young specimen from Anisacate, Córdoba, found in the FCM collection was captured in February. Two lactating females were collected in mid-January in Andalgalá, Catamarca, and another at the end of November in Vado de Arrazayal, Salta Province. Although this is a migratory species, movements are not known in Argentina or in most of Latin America. In spite of its solitary habits, it would seem that they migrate in groups (La Val and La Val, 1979). They normally prefer open areas near urban and disturbed zones, but we have captured them in forests over water.

This species feeds on insects and begins its nocturnal activity before other species, rapidly ascending to a high altitude where it hunts insects while flying (Shump and Shump, 1982*a*). Whitaker (1972) analyzed stomach contents of 128 specimens from Indiana, and found that they contained 26% moths. Other insects are eaten, most frequently dipterans, homopterans, coleopterans, hymenopterans and lepidopterans (Shump and Shump, 1982*a*). This species is known to be preyed upon by Stygian owls (*Asio stygius*) in the Brazilian cerrado (Motta Junior and Taddei, 1992), and by barn owls (*Tyto alba*) in Misiones Province, Argentina (Massoia et al., 1989*b*, 1989*c*, 1989*d*).

Specimens Examined.— (134). BUENOS AIRES: Bella Vista, 3 (MACN); Buenos Aires, 1 (MACN); La Plata, 14 (MLP); Longchamps, 1 (MACN). CATAMARCA: Andalgalá, 2 (1 CM, 1 MACN); Balneario El Caolín, 6 km NW Chumbicha, 13 (OMNH); Chumbicha, 1 km N and W of balneario by road, 2,600 ft., 6 (2 CML, 2 IADIZA-CM, 2 OMNH); Chumbicha, at balneario, 2,400 ft., 1 (OMNH); Dique El Potrero, 1 (CM); Dique El Potrero, 13 km N Andalgalá, 1 (CML); El Potrero, 13 km N Andalgalá, 6 (CM); Potrero River Dike, El Potrero, 2 (MSB); Río Potrero, 13 km N Andalgalá, 2 (CML); Río San Pablo, 3 km NW Concepción, 1 (CM). CHACO: Resistencia, 1 (TCWC). CÓRDOBA: Anisacate, 1 (FCM); Bialet Massé, 2 (MACN); Cruz del Eje, 5 (BMNH, including

the type of *L. salinae*); La Paz, 3 (MACN). CORRIENTES: Laguna Paiva, B° Las Lomas, 1 (OMNH). ENTRE RÍOS: Primero de Mayo, 1 (TCWC). JUJUY: El Monolito, 1 (CML); Laguna La Brea, 25 km W Palma Sola, 2 (CML); Yuto, 9 (7 AMNH, 1 CML, 1 FCM). LA PAMPA: General Pico, 2 (MACN). MISIONES: Arroyo Urugua-í, km 10, 6 (MACN); Montecarlo, 1 (FMNH). SALTA: Hotel Termas, Rosario de La Frontera, 1 (TTU); Orán, 15 km S, 15 km W, along Río Santa María, 1 (CM); Piquirenda Viejo, 8 km W, 1 (CML); Quebrada de Acambuco, 5 km W Dique Itiyuro, 1 (IADIZA-CM); Salta, 2 (TTU); Vado de Arrazayal, 1 (OMNH). SAN JUAN: Astica, 1 (MACN); Pedernal, 1 (OMNH). SANTA FE: Santa Fe, 1 (MFA). TUCUMÁN: Agua Rosada, 1 (CML); Arroyo Aguas Chiquitas, Reserva Provincial Aguas Chiquitas, 1 (CML); Concepción, 3 (BMNH); Horco Molle, 1 (TTU); Ingenio Amalia, 2 (CML); Ingenio Santa Lucía, 1 (CML); Instituto Lillo, 1 (CML); Las Juntas, 22 km W Choromoro on Hwy 312, 3,500 ft., 1 (OMNH); Las Tipas, Parque Biológico, 1 (CML); Los Vásquez, 445 m, 3 (BMNH); Pinar Velardez, 1560 m, 1 (CML); Reserva Provincial Santa Ana, Remanso del Gallego, 1 (CML); Río Pueblo Viejo, Reserva Provincial La Florida, 1 (CML); San Miguel de Tucumán, 8 (CML); San Pedro de Colalao, 2 (CML); Timbó Nuevo, 1 (MACN); Tucumán, 2 (1 FMNH, 1 MCZ); Tucumán, 1500 m, 1 (BMNH); Tucumán, 456 m, 2 (BMNH); Tucumán, ciudad, 1 (MACN).

Additional Records.— BUENOS AIRES: Azul (Fornes and Massoia, 1967); Granja 17 de Abril (Massoia, 1988*b*); Paraná de Las Palmas y Canal 6 (Fornes and Massoia, 1967). CHACO: Colonia Benítez (Romaña and Abalos, 1950). CÓRDOBA: Río Ceballos (Wainberg and De Rosa, 1966); Río Cuarto (Tiranti and Torres, 1998); Segunda Usina (Tiranti and Torres, 1998). FORMOSA: El Colorado (Massoia, 1970). MISIONES: Arroyo Urugua-í (Massoia et al., 1987); Arroyo Yabebyri, entre Loreto y el Arroyo Yabebyri, sobre ruta 12 (Massoia et al., 1989*d*); Bonpland (Massoia et al., 1989*c*); Departamento Cainguás (Massoia, 1980); Departamento Candelaria (Massoia, 1980); Departamento Capital (Massoia, 1980); Departamento Guaraní (Massoia, 1980); Los Helechos, Escuela n° 12 (Massoia et al., 1989*b*). SALTA: Finca La Florida, Rosario de Lerma, 25 km SSW Salta (Villa-R. and Villa-C., 1971). SANTIAGO DEL ESTERO: La Banda (Romaña and Abalos, 1950). TUCUMÁN: El Colmenar (Romaña and Abalos, 1950); Las Juntas, 22 km W Choromoro (Mares et al., 1995).

Lasiurus cinereus (Beauvois)

Vespertilio cinereus Beauvois, A scientific and descriptive catalogue of Peale's museum. S. H. Smith, Philadelphia, p. 18, 1796.

Lasiurus cinereus: H. Allen, Smithsonian Miscellaneous Collections, 7:21, 1864.

Type Locality.— United States of America, Pennsylvania, Philadelphia.

Distribution.— Only one subspecies is found in South America, where it is restricted to a strip that includes western Venezuela, Colombia, Ecuador, central Peru and Bolivia, Paraguay, southern Brazil, northern and central Argentina, and central Chile (Koopman, 1982).

Lasiurus cinereus villosissimus (É. Geoffroy St.- Hilaire)

Vespertilio villosissimus É. Geoffroy St.- Hilaire, Annales du Muséum d'Histoire Naturelle, Paris, 8:204, 1806.

Lasiurus cinereus villosissimus: Thomas, Annals and Magazine of Natural History, ser. 7, 8:435, 1901.

Type Locality.— Paraguay. Restricted to Asunción by Cabrera (1958), because that is "where the first specimen of the seventh bat of the 'Essais' de Azara, base of the name *villosissimus* was captured," referring to comments of Morales Agacino (1941).

Distribution in Argentina.— Figure 107.

Description (Figs. 108a and 109).—This is the largest species of *Lasiurus* in South America, similar in size to *Dasypterus ega*, but slightly larger; the length of the forearm ranges from 51.5 to 56.0 mm. General appearance is similar to *L. borealis*. Ears are small and rounded, with yellow hairs on the inner margins and on the basal one-half of the outer surface of the pinnae. The tragus lacks a projection on its external margin (in contrast to *Dasypterus*). Dorsally, yellow tufts are present at the base of the thumb, at the base of the fifth finger where it articulates with the forearm, and at the

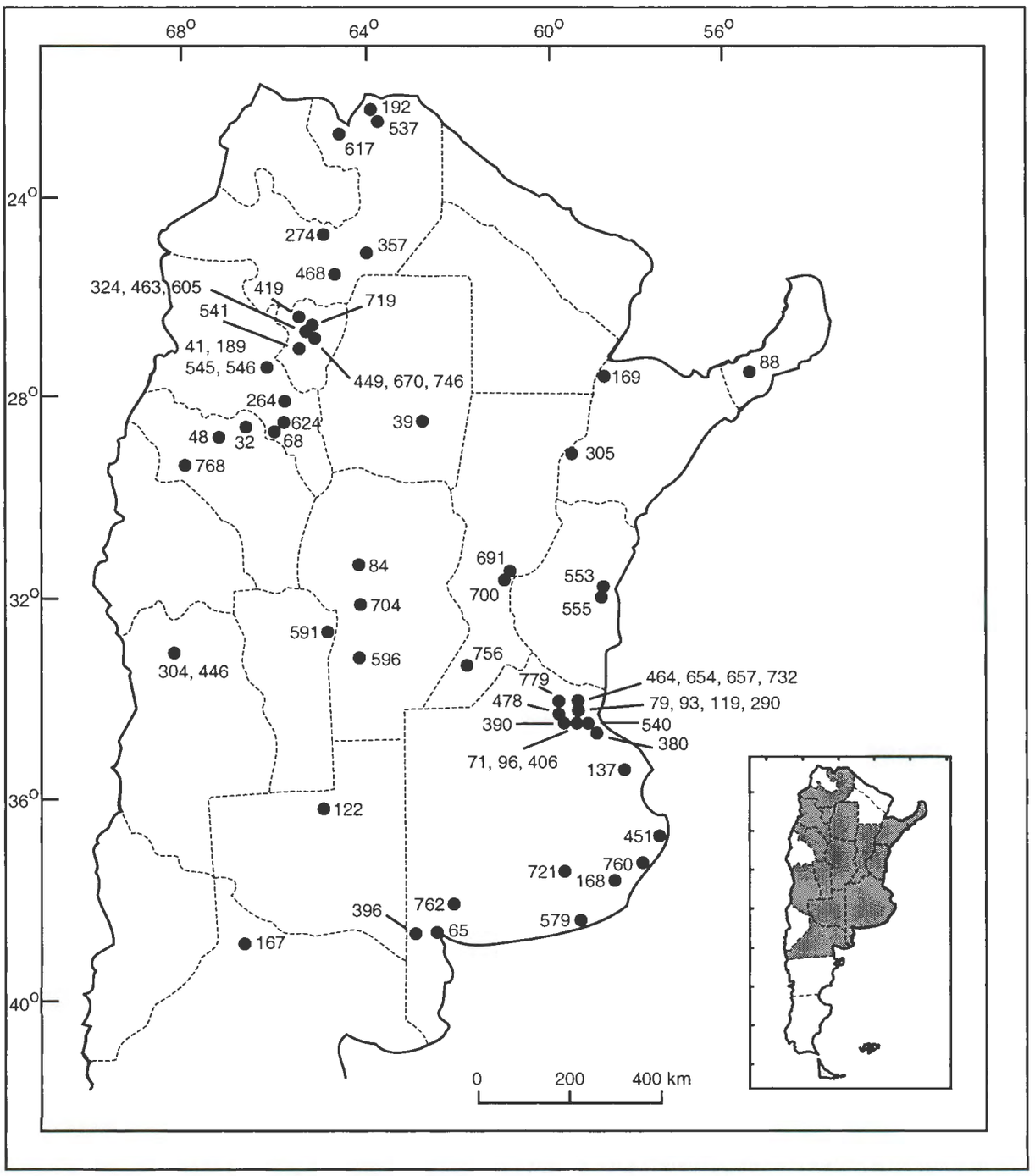


Figure 107. Map of the localities of *Lasiurus cinereus*.

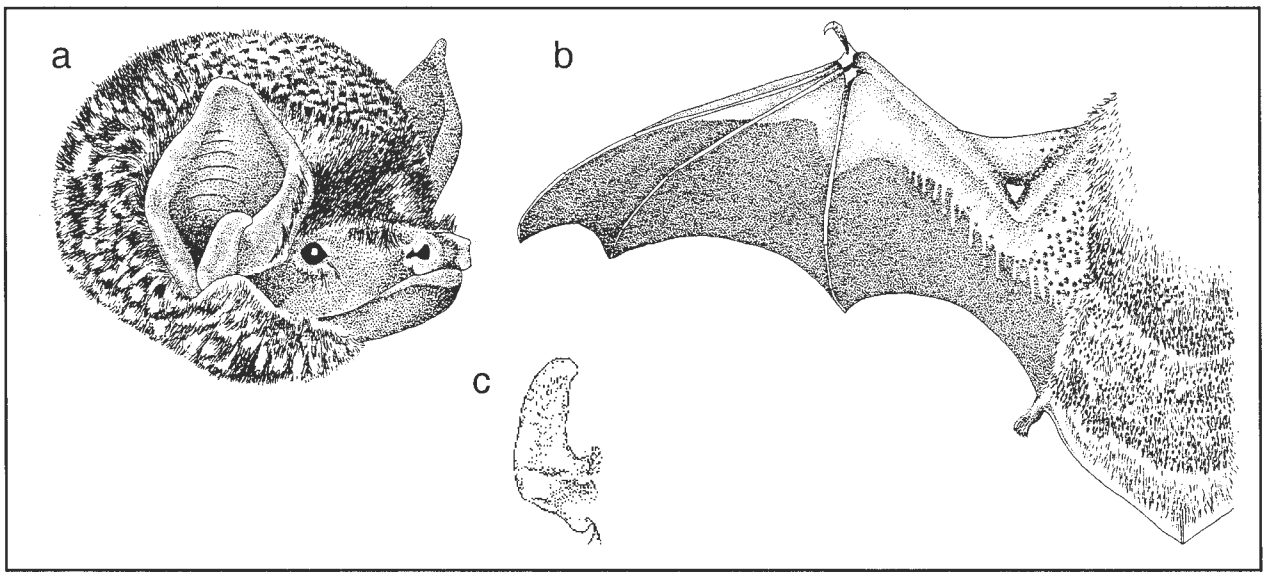


Figure 108. *Lasiurus cinereus*: (a) face, lateral view; (b) wing and uropatagium; and (c) tragus.

distal end of the forearm over the propatagium. Dorsally, the hairs extend to the sides of the body and completely cover the uropatagium, becoming less dense toward the distal edge. Ventrally, hairs cover the basal one-half of the uropatagium and extend over the wings bordering the forearm. The dorsal hairs have a dark or black basal band of about 1.5 mm, followed by a wider yellow or cream band of about 6 mm, that is followed by a narrower dark brown band; the tip is white. On the posterior portion of the body the yellow band is replaced by one that is dark brown in color. The hairs of the uropatagium are bicolored, with a wide brown band and paler tips. Ventral coloration is similar to that of the dorsum, but the hairs are shorter and the yellow band is narrower; the hairs of the abdomen are bicolored, with a wide dark-brown base and cream tips. The membranes are dark, generally brown or black, but paler (whitish or reddish) along the edges and bordering the phalanges and the forearm.

In some specimens the yellow band of the dorsal hairs is followed by a shorter cinnamon one; the tips are white. This seems to be a pale color phase, in which the distal one-half of the ventral hairs are yellowish or slightly brushed with cinnamon. This phase is common in specimens from Tucumán Province. The frosted or hoary appearance is always evident, despite the color phase or banding pattern.

In some specimens of *L. cinereus* the P1 was lacking on one or both sides, which makes it similar to *Dasypterus ega*. Externally both species can be distinguished by color and size, as well as by the extension of the hairs on the uropatagium.

Measurements.— Table 15.

Comments.— The habits of this species are similar to *L. blossevillii*. It is solitary, roosting during the day between branches and leaves of trees in forests and cities. A specimen was found roosting 20 m high in a tree in a garden in the city of Tucumán; it emerged from its roost at dusk and rapidly attained high altitude, emitting strong chirps that could be distinguished from those of other species (R. M. Barquez, personal observation). We have frequently observed them in openings in forests flying over wide rivers and ravines. Apparently, the time of emergence is coordinated even though this species is solitary, as large numbers of them appear at the same time. While roosting, they hang by a foot and envelope the body with the wings.

As in the previous species, their migratory movements are unknown in South America. This species is insectivorous. According to Kunz (1973), the presence of *L. cinereus* limits the distribution of *L. borealis*, but whether of not *L. cinereus* limits the distribution of *L. blossevillii* is unknown.

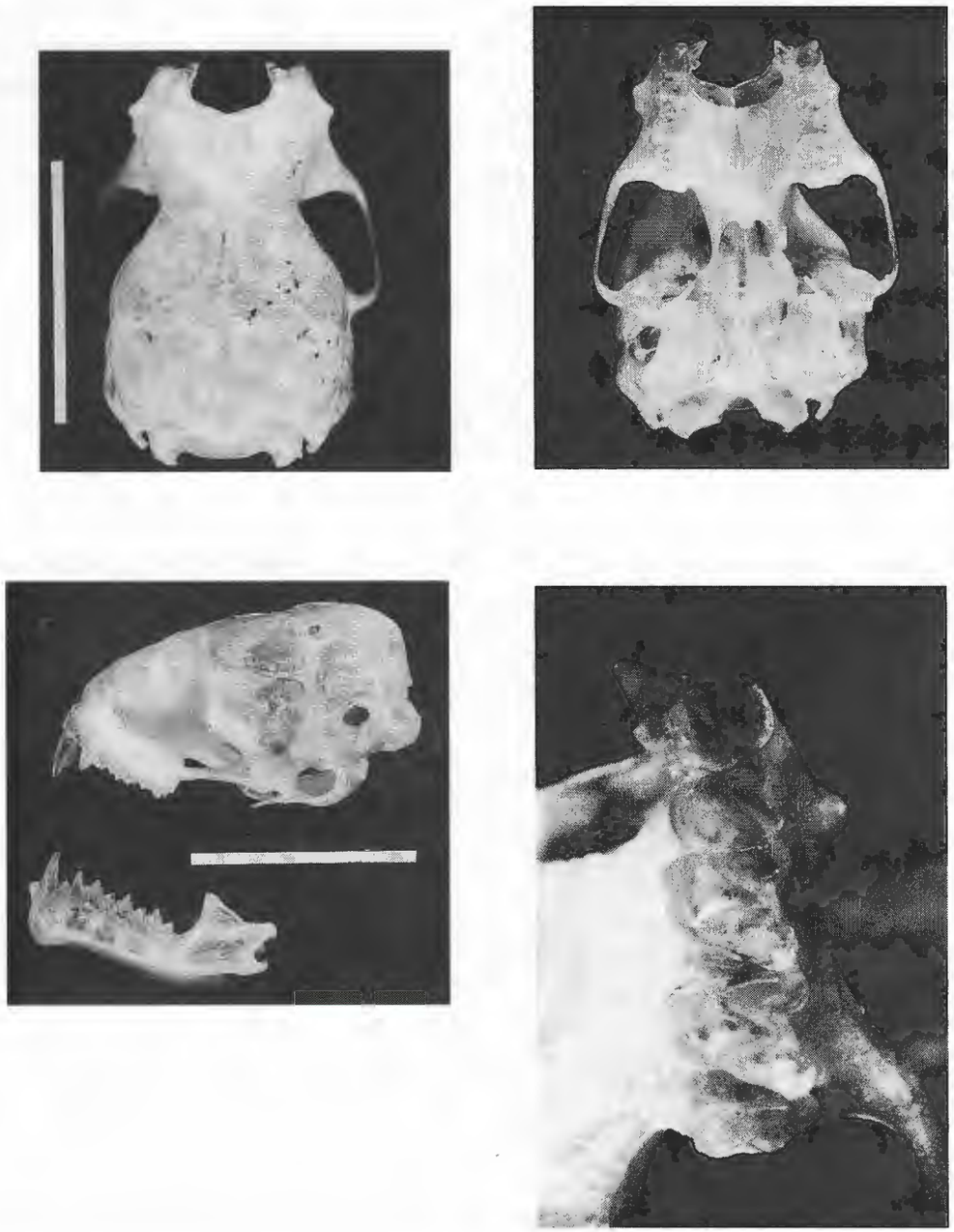


Figure 109. Skull and teeth of *Lasiurus cinereus*. Adult male from Piquirenda Viejo, 6 km W, Salta Province (OMNH 18666). Bar = 1 cm. Teeth not to scale.

Table 15. Measurements of Lasiurus cinereus *and* Lasiurus varius. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Lasiurus cinereus*	*Lasiurus varius*
Total length	129.8 ± 5.61, 13	108.0 ± 4.87, 7
	119.0 - 135.0	105.0 - 118.0
Tail length	56.0 ± 5.56, 13	52.1 ± 4.67, 7
	44.0 - 65.0	44.0 - 58.0
Hindfoot length	8.8 1.16, 9	7.3 1.44, 7
	7.5 - 11.2	6.0 - 10.0
Ear length	17.7 ± 1.33, 13	11.8 ± 1.84, 7
	15.0 - 19.5	9.0 - 13.9
Forearm length	52.9 ± 1.61, 17	40.6 ± 0.88, 7
	50.2 - 56.0	39.9 - 42.1
Weight	18.4 ± 2.70, 12	10.2 ± 1.06, 2
	13.5 - 22.2	9.5 - 11.0
Condylobasal length	14.7 ± 0.44, 17	12.6 ± 0.24, 7
	14.1 - 15.9	12.2 - 12.9
Least interorbital breadth	7.4 ± 0.18, 9	6.0 ± 0.08, 7
	7.1 - 7.7	5.9 - 6.1
Zygomatic breadth	11.5 ± 0.27, 15	9.7 ± 0.10, 7
	11.2 - 12.0	9.6 - 9.8
Greatest length of skull	15.2 ± 0.34, 17	13.0 ± 0.21, 7
	14.6 - 15.8	12.8 - 13.4
Postorbital constriction	5.3 ± 0.15, 17	4.5 ± 0.13, 7
	5.1 - 5.7	4.3 - 4.7
Breadth of braincase	8.7 ± 0.19, 16	7.7 ± 0.19, 7
	8.4 - 9.1	7.5 - 8.0
Length of maxillary toothrow	5.5 ± 0.14, 17	4.6 ± 0.07, 7
	5.2 - 5.7	4.5 - 4.7
Palatal length	6.5 ± 0.35, 13	5.5 ± 0.20, 6
	5.9 - 7.1	5.3 - 5.9
Mastoidal breadth	9.6 ± 0.18, 17	7.8 ± 0.39, 7
	9.4 - 10.0	7.0 - 8.2
Length of mandibular toothrow	6.2 ± 0.16, 17	5.3 ± 0.05, 7
	5.9 - 6.5	5.3 - 5.4
Length of mandible	11.7 ± 0.32, 17	9.8 ± 0.09, 7
	11.3 - 12.6	9.7 - 10.0.
C-C (width across canines)	6.4 ± 0.15, 17	5.2 ± 0.16, 7
	6.2 - 6.7	5.0 - 5.4
M-M (width across molars)	7.7 ± 0.21, 17	6.3 ± 0.13, 7
	7.3 - 8.1	6.1 - 6.5

Cases of rabies in *L. cinereus* have been detected in the United States (Shump and Shump, 1982*b*).

Bogan (1972) commented on birth and development in this species in North America. Females apparently give birth to two young. Little data exist on reproduction and development in Argentina. A juvenile with cartilaginous phalanges was captured at the beginning of December at Martínez, Buenos Aires. Reproductively active males were collected during mid-November at Piquirenda Viejo, Salta.

Villa-R. and Villa-C. (1971) reported the capture of a banded specimen in the Salta Province, which regrettably escaped before the band was read. They suggested the possibility that it may have been a Nearctic specimen captured during migration. However, Arambarri (personal communication to R. M. Barquez)

reported that personnel of the Servicio Nacional de Sanidad Animal, Argentina, have banded *L. cinereus* in Argentina on many occasions and have recaptured individuals several years later. Thus, the specimen captured by Villa-R. and Villa-C. may not have been banded in North America. Like *L. blossevillii*, *L. cinereus* is known to be preyed upon by Stygian owls (*Asio stygius*) in the savannas of Brazil (Motta Junior and Taddei, 1992).

Specimens Examined (89).— BUENOS AIRES: Bandfield, 1 (MACN); Belgrano, 1 (BMNH); Buenos Aires, 2 (1 BMNH, 1 USNM); Burzaco, 1 (MACN); Capital Federal, 2 (MACN); Chascomús, 1 (MACN); Floresta, 1 (ROM); La Plata, 7 (2 BMNH, 5 MLP); Laferrere, 1 (MACN); Los Yngleses, Ajó, 4 (BMNH); Martínez, 2 (FCM); Moreno, 1 (MACN); Río de La Plata mouth, 30 or 40 mi S, Patagonian coast, 2 (BMNH); San Isidro, 1 (FCM); Tandil, 1 (MACN); Tigre, 1 (MACN); Villa Gesell, 1 (CML). CATAMARCA: Andalgalá, 13 km N, 7 (CM); Balneario El Caolín, 6 km NW Chumbicha, 2 (OMNH); Dique El Potrero, 13 km N Andalgalá, 1 (CML); Estancia Las Juntas, 1 (CML); Potrero Dike, 13 km N Andalgalá, 6 (CM); Potrero River Dike, El Potrero, 1 (MSB); Río San Pablo, 3 km NW Concepción, 5 (4 CM, 1 CML). CORRIENTES: Corrientes, 2 (1 BMNH, 1 OMNH). ENTRE RÍOS: Primero de Mayo, 1 (CML); Pronunciamiento, 2 (CML). LA RIOJA: Aimogasta, 1 (MACN); Antinaco, 1130 m, 1 (CML); Villa Unión, 5 (MACN). MENDOZA: Mendoza, 3 (1 MCZ, 1 MJCM, 1 MVZ). SALTA: Dique Itiyuro, 5 km W, 1 (RAO); Joaquín V. González, 8 km SE, Finca San Javier, 1 (CML); Metán, 1 (CML); Piquirenda Viejo, 6 km W, 3 (OMNH); Río Pescado, 2 (1 CML, 1 OMNH). SAN LUIS: Rincón de Papagayos, 2 km E Papagayos, 1 (OMNH). SANTA FE: Santa Fe, 1 (MFA); Sauce Viejo, 1 (MFA); Venado Tuerto, 1 (MACN). TUCUMÁN: Horco Molle, Río Las Piedras, 1 (CML); Las Mesadas, 1 (CML); Los Vásquez,1 (BMNH); Marcos Paz, 1 (CML); Playa Larga, Río Los Sosa, Ruta 307 km 19.7, 1 (RMB); Río Las Piedras, Parque Biológico Sierra de San Javier, 1 (CML); San Miguel de Tucumán, 1 (CML); Tafí Viejo, 1 (CML); Tucumán, 456 m, 1 (BMNH).

Additional Records.— BUENOS AIRES: Bahía Blanca (Sanborn and Crespo, 1957); Coronel Vidal (Sanborn and Crespo, 1957); Delta del Paraná (Sanborn and Crespo, 1957); Isla Ella (Sanborn and Crespo, 1957); Laguna Chasicó (Contreras, 1973); Lanús (Sanborn and Crespo, 1957); Plátanos (Sanborn and Crespo, 1957); Quequén (Sanborn and Crespo, 1957); San Fernando (Sanborn and Crespo, 1957); Villa La Ventana (Massoia et al., 1993); Zelaya (Sanborn and Crespo, 1957). CÓRDOBA: Bialet Massé (Sanborn and Crespo, 1957); Río Cuarto (Tiranti and Torres, 1998); Segunda Usina (Tiranti and Torres, 1998). CORRIENTES: Goya (Sanborn and Crespo, 1957). LA PAMPA: Carro Quemado (Sanborn and Crespo, 1957). MENDOZA: Godoy Cruz (Fornes and Massoia, 1967). MISIONES: Bonpland (Vaccaro and Massoia, 1988*b*); Departamento Oberá (Massoia and Chebez, 1989). RÍO NEGRO: Coronel J. F. Gómez (Vaccaro, 1992). SALTA: Finca Belgrano, Cerrillos, 30 km SW Salta (Villa-R. and Villa-C., 1971). SANTIAGO DEL ESTERO: Añatuya (Yepes, 1944).

Lasiurus varius (Poeppig)

Nycticeius varius Poeppig, Reise in Chile, Peru und auf dem Amazonenstrome während der Jahre 1827-1832. Friedrich Fleischer, Leipzig, 1:451, 1835.

Lasiurus varius: Allen, Bulletin of the American Museum of Natural History, 14:46, 1901.

Type Locality.— Chile, Bío Bío, Antuco.

Distribution.— *Lasiurus varius* is known only from the Argentine localities given in the Specimens Examined and from central and southern Chile. According to Cabrera (1958) it is found from southern Peru southward in Chile to the province of Valdivia, and in western Argentina. But as noted above, Cabrera (1958) likely considered the red phase specimens of *L. borealis* as *L. b. varius*. This has confused other authors such as Olrog (1959), who mentioned specimens of *L. b. varius* from Tucumán and Jujuy, which we have reidentified as *L. b. blossevillii* (see *L. b. blossevillii* account). It is probable that Dabbene's (1902) record of *Atalapha borealis* for Tierra del Fuego corresponds to *L. varius*, but we have been unable to locate the specimens from that area.

Distribution in Argentina.— Figure 110.

Description (Figs. 103f, 103g, and 111).— General aspect is similar to *L. blossevillii*, but *L. varius* is slightly larger. Color is deep reddish and lacks frosting.

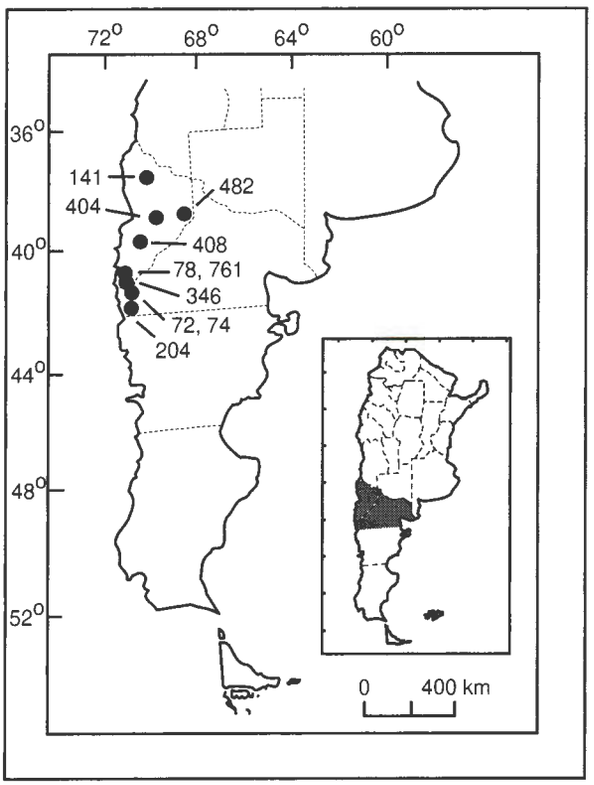


Figure 110. Map of the localities of *Lasiurus varius*.

The ear is fringed with hairs along its basal outer margin, and the antitragus is high. Hairs are long and extend beyond the edge of the uropatagium. In other *Lasiurus* the margin of the uropatagium is naked. Dorsal hairs are tricolored, with the bases black for about 2 mm, followed by a yellowish band that gradually darkens and terminates in the brilliant cinnamon red color that characterizes this species. A yellow shoulder patch is more pronounced than in other *Lasiurus*. On the hairs of the venter the black band is wider and the yellow band almost disappears, being replaced by the terminal cinnamon red band. Except for the uropatagium, the distribution of the hairs over the body is similar to *L. borealis*.

The skull is similar to the other species of *Lasiurus*, but more robust. The rostrum is short and wide. The nasals and the anterior portion of the palate are strongly invaginated so that the incisors of each side are separated by a wide gap. The braincase is elevated and almost rounded. The median anterior margin of the palate is aligned with the small premolars and extends posteriorly beyond M3; the hamular process of the pterygoids extends to the height of the glenoid fossae. The caudal spine of the palate is well developed in *L. varius*, whereas in *L. blossevillii* it is undifferentiated. The sagittal crest is normally reduced, although in some specimens it is evident toward the anterior part of the braincase. The lambdoid crests are slightly developed and the paraoccipital process is small but sharp. The zygomatic arches are thin. The tympanic bullae are well developed, but barely cover half of the cochlea.

The dental formula is I 1/3, C 1/1, P 2/2, M 3/3, total 32. The I1 is triangular and inclined inward, its internal face is furrowed, and its base is in contact with the upper margin of the cingulum of the canine. The canines are long and sharply pointed. The P1 is small, rounded, and displaced to the lingual side of the toothrow so that the canine and P2 are in contact with one another, and P1 is not visible in lateral view. The P2 is well developed and unicuspidate. The M1 and M2 are well developed. The cusps form a "W," the protocone is elevated and sharpened, and the hypocone absent; M3 has only two commissures. The lower inner incisors are trilobed, while the others are bilobed; the incisors form a continuous row that completely fills the space between the canines. The p1 is small (p2 is more than twice as large as p1), and both have small paraconids and metaconids. In m1 and m2 the trigonid is about the same size as the talonid. In m3, the talonid is much larger than the trigonid because the hypoconid and entoconid are closer to each other, and the protoconid and metaconid are well separated.

Measurements.— Table 15.

Comments.— The biology of this species is virtually unknown. A pregnant female with two embryos was captured in Bariloche, Río Negro, on 22 November (MVZ), and a juvenile from Bariloche, 3 km W, was obtained at the end of February. Pregnant females were collected by us in Neuquén in the summer month of December (Mares et al., 1995).

Specimens Examined (15).— NEUQUÉN: Beatriz, Nahuel Huapi, 800 m, 2 (BMNH); Chos Malal, 1 (MACN); Isla Victoria, 1 (CML); Laguna Miranda, Zona Zapala, 1 (MACN); Las Coloradas, 1000 m, 3 (MACN); Neuquén, 1 (BMNH); Villa La Angostura, 19 km N along Hwy. 234, 3 (1 CML, 1 IADIZA-CM, 1 OMNH). RÍO NEGRO: Bariloche, 1 (MVZ); Bariloche, 3 km W, 1 (MVZ); El Bolsón, 1 (MACN).

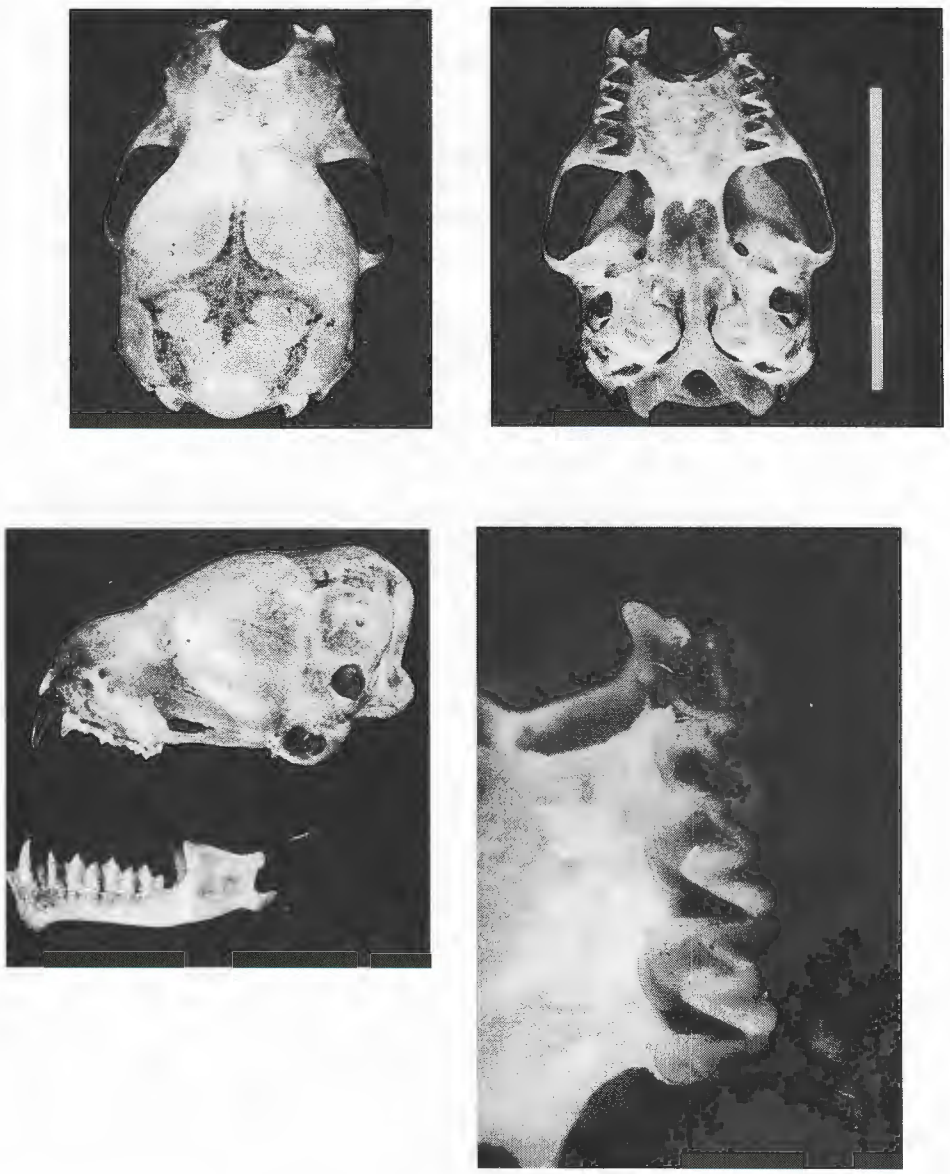


Figure 111. Skull and teeth of *Lasiurus varius*. Adult male from Isla Victoria, Neuquén Province (CML 2005).

FAMILY MOLOSSIDAE

Free-tailed bats are widely distributed throughout the world, and are especially diverse in tropical and subtropical regions. Presently 12 genera and approximately 86 species are recognized. Molossids may be distinguished from other bats by both cranial and external characters. The tail extends for one-half its length beyond the uropatagium; the wings are narrow due the fifth digit being the same length as the third metacarpal; the feet are wide, rounded, and have stiff bristles. Bristles also are present on the muzzle.

In Argentina, there are 7 genera and 18 species, if one considers *Cynomops* distinct from *Molossops* (Thomas, 1920*a*) and *Nyctinomops* from *Tadarida* (Freeman, 1981*a*). Most species are confined to northern and central Argentina. *Tadarida brasiliensis* occurs throughout most of the Western Hemisphere and has the southernmost distribution of any bat in this family in South America.

Body size of molossids varies from small (*Molossops temminckii)* to large (*Eumops perotis*). Body color is generally dark brown or gray, although some individuals are quite reddish. Facial and body stripes are absent. The ears are variable in shape and size, from relatively small and separated to large and united by a band, or some combination of these characters. The antitragus is better developed than the tragus; the latter may be greatly reduced in some species.

The skull is generally strong and robust. The postorbital process is absent. The teeth are tuberculosectorial, the "W" formed by the cusps clearly marked; the fourth commissure of the last upper molar is absent and the third is reduced or absent in some species.

All species are exclusively insectivorous. The relative development of the mandible and the robustness of the cranium and teeth can indicate specialization toward either hard or soft insects (Freeman, 1979). Molossids apparently are opportunistic in selecting of roosts. Many species are closely tied to human dwellings; others use natural or artificial caves, holes in trees, mines, and crevices. According to Kunz (1982), species that use crevices have modified pelvic and pectoral girdles and a dorsoventrally flattened skull. Molossids normally live in groups that form large colonies, but some species are solitary. In many species, sexual dimorphism is evident and individual and geographic variation is common.

Despite several major reviews (e.g., Eger, 1977; Freeman (1981*a*; Miller, 1913*b*; Sanborn, 1932; and Shamel, 1931), the ecology, distribution, and taxonomy of this group are poorly known as far as Argentine species are concerned.

KEY TO THE SPECIES

1. Upper lips wrinkled; palate notched anteriorly 2
1'. No wrinkles on lips; palate without anterior emargination 4

2 (1). Ears separated; second phalanx of the fourth finger > 7.0 mm; length of forearm 41 to 46 mm; rostrum short; basisphenoid pits usually shallow; incisors 1/3, tips of I1 converging, not parallel ..... *Tadarida brasiliensis*
2'. Ears joined by a band or forming a V-shaped valley on the forehead; second phalanx of fourth finger < 5.0 mm; length of forearm 43 to 63 mm; rostrum enlarged and narrow; basisphenoid pits deep; incisors 1/2, tips of I1 almost parallel 3

3. Length of forearm 43 to 45 mm ..... *Nyctinomops laticaudatus*
3'. Length of forearm 58 to 63 ..... *Nyctinomops macrotis*

4 (1'). Incisors 1/1, 26 teeth 5
4'. Incisors 1/2, 28 to 30 teeth 8

5 (4). Upper incisors triangular, completely filling the space between the canines; M3 with two commissures forming a V; sagittal crest well developed 6
5'. Upper incisors long and slender (not triangular), and not filling the space between

the canines; M3 with three commissures, the third half the length of the second; sagittal crest moderate to absent 7

6 (5). Length of forearm > 45 mm ..... *Molossus ater*
6'. Length of forearm < 43 mm ..... *Molossus molossus*

7 (5'). Forearm < 34 mm; postorbital constriction < 4.0 mm; general coloration pale or dark gray ..... *Molossops temminckii*
7'. Length of forearm more than 37 mm; postorbital constriction > 4.5 mm; general coloration dark reddish ..... *Molossops neglectus*

8 (4'). Total number of teeth 28; lacrimal ridges well developed; mastoid processes projecting laterally 9
8'. Total number of teeth 30; lacrimal ridges poorly developed 11

9 (8). Size large; length of forearm > 45 mm; greatest length of skull > 19 mm ..... *Cynomops abrasus*
9'. Size smaller; length of forearm 30 to 35 mm 10

10 (9'). Length of forearm 30 to 34 mm; broad whitish or yellowish band on the chest and/or abdomen; upper lip fleshy (thick) and strongly projected forward; ears close together, but separated by a small space (1 or 2 mm); greatest length of skull 15.0 to 16.5 mm ..... *Cynomops planirostris*
10'. Length of forearm 34 to 35 mm; light spot on chest or abdomen may be present, but somewhat less evident, or even absent; upper lip not strongly projected forward; ears separated by a greater space than above; greatest length of skull > 16.0 mm ..... *Cynomops paranus*

11 (8'). Ears short and rounded; antitragus constricted at the base; ear-keel low; rostrum elevated and strongly convex 12
11'. Ears larger, wide, and expanded laterally; ear-keel strongly evident; antitragus not constricted at the base; rostrum flat 13

12 (11). Length of forearm > 50 mm ..... *Promops centralis*
12'. Length of forearm < 50 mm ..... *Promops nasutus*

13 (11'). Length of forearm > 70 mm 14
13'. Length of forearm < 70 mm 15

14 (13). Ears, when laid forward, not extending over the nose ..... *Eumops dabbenei*
14'. Ears, when laid forward, extending over the nose ..... *Eumops perotis*

15 (13'). Length of forearm > 55 mm 16
15'. Length of forearm < 50 mm 17

16 (15). Color of body pelage gray cinnamon; tragus well developed and somewhat square ..... *Eumops glaucinus*
16'. General coloration darker, blackish cinnamon; tragus small and pointed ..... *Eumops auripendulus*

17 (15'). Length of forearm 46 to 49 mm; ear-keel ending at posterior margin of antitragus; basisphenoid pits well separated ..... *Eumops bonariensis*
17'. Length of forearm 43 to 47 mm; ear-keel scarcely reach anterior border of antitragus; basisphenoid pits very close to each other ..... *Eumops patagonicus*

Genus *Molossops*

Cynomops and *Molossops* generally are recognized as subgenera of *Molossops*, but both are quite distinct externally and cranially. Freeman (1981*a*) indicated that the two subgenera are similar in shape and that they should be included within one genus. She also noted (Freeman, 1981*a*) that, although *Cynomops* and *Molossops* are chromosomally different (based on Gardner, 1977*b*), variation in chromosome number within the same genus is not uncommon (e.g., *Eumops*). With the variable number of chromosomes in the inclusive genus *Molossops*, and with external and cranial differences between *Cynomops* and *Molossops* being greater than those that exist between other recognized subgenera, such as *Nyctinomops* and *Tadarida,* a strong case can be made for generic recognition of both *Cynomops* and *Molossops*.

Cabrera (1958) considered the characteristics that motivated Thomas (1920*a*) to recognize *Cynomops* as a distinct genus as having only subgeneric value; consequently, he placed *Cynomops* in synonymy with *Molossops*. We recognize *Cynomops* and *Molossops* as distinct genera given their many differences. For example, all *Cynomops* have two pairs of lower incisors, an M3 with two commissures and the metacone absent, a simple m3 with a talonid having only one cusp, lacrimal furrows that are strongly developed, and ears that are separated but close to each other. Species of *Molossops*, however, have only one pair of lower incisors, an M3 with three commissures clearly marked, a complex m3 with two notable cusps, lacrimal furrows that are less developed, and ears separated by a wide space.

Molossops neglectus Williams and Genoways

Molossops neglectus Williams and Genoways, Annals of Carnegie Museum, 49:489, 1980.

Type Locality.— Suriname, 1 km S, 2 km E Powaka.

Distribution.—Barquez (1987) and Barquez et al. (1993) listed this species for Argentina after comparing Argentine specimens with the type specimen at the CM, and with specimens of *Molossops neglectus* in the USNM from Pasco, Peru, and from Pará, Brazil (see also Ascorra et al., 1991). The distribution of *Molossops neglectus*, therefore, extends from Suriname to Argentina.

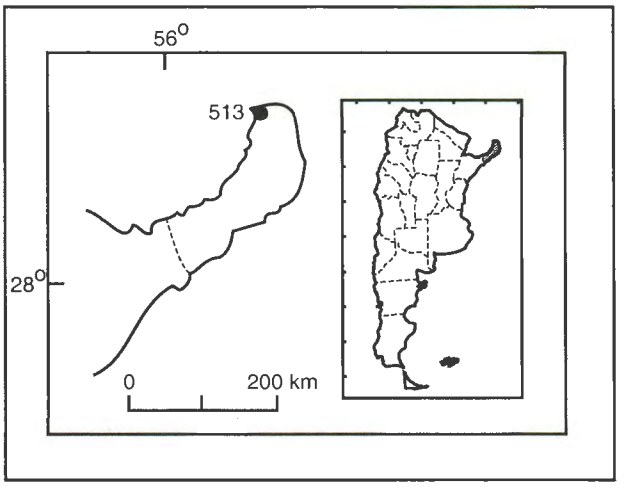


Figure 112. Map of the localities of *Molossops neglectus*.

Distribution in Argentina (Fig. 112).—Known only from northernmost Misiones Province in the rain forest of Iguazú National Park.

Description (Figs. 113 and 114).—The color is dark, with the dorsal hairs about 4 mm in length, light cream, or almost white on the basal half, and dark cinnamon brown on the distal half. The venter is similar to the dorsum, but paler, and with the tips of the hairs grayish. The membranes and ears are dark, almost black. The ears are well separated, have an obvious fold at their point of attachment, are triangular, and have rounded tips. The antitragus is twice as long as it is wide. The tragus is well developed and wide at the base. The snout is elongated. The upper lips are bordered by a fine fringe of hairs and have a tuft of bristles below the nostrils. The free portion of the tail is about 10 mm in length.

The skull is typical of the genus. The sagittal crest is poorly developed, although slightly elevated on the posterior one-third of the braincase where it unites with the lambdoidal crest. The palate is arched. The zygomatic arches are complete but weak. The tympanic bullae are well developed, covering more than half of the cochlea. Lacrimal crests and furrows are distinct, but not well developed.

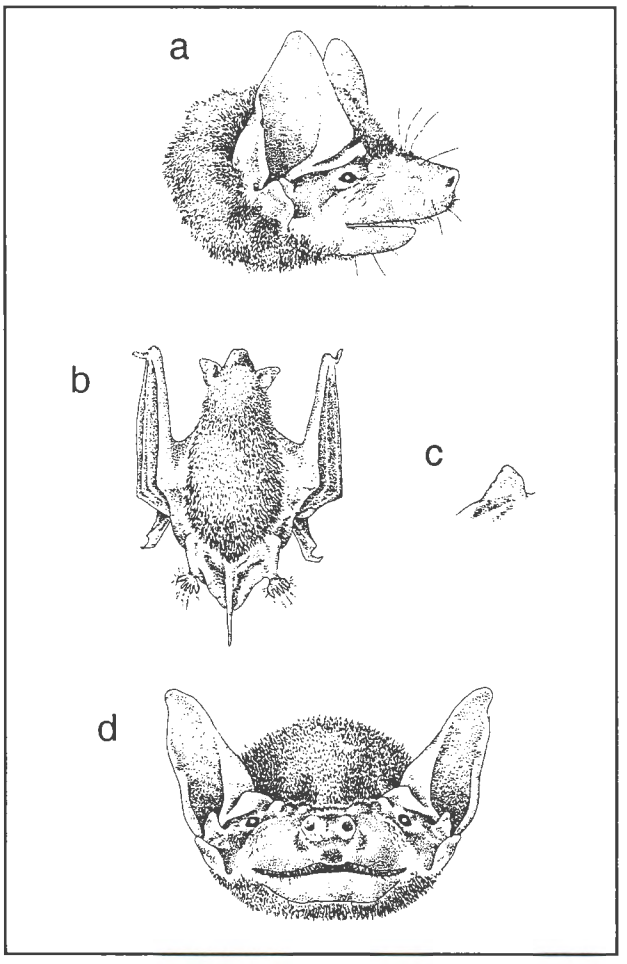


Figure 113. *Molossops neglectus*: (a) face, lateral view; (b) body, dorsal view; (c) tragus; and (d) face, frontal view.

The dental formula is I 1/1, C 1/1, P 1/2, M 3/3, total 26. The upper incisors are curved in lateral view and in contact at the base; they do not fill the space between the canines. The M3 has three commissures, the third greater than one-half the length of the second, and with a well-developed metacone. The i1 is bilobed, its tip barely reaching the base of the cingulum of the canine. p1 and p2 are laterally compressed, and p2 is almost twice the size of p1. The m3 has a well-developed talonid and two well-marked cusps.

Measurements.— Table 16.

Comments.— This species differs from *M. temminckii* by its larger size, wider postorbital constriction, and less-developed lacrimal crests and furrows. From the nominal subspecies, it differs by a longer forearm, a more pronounced postorbital constriction, and a shorter skull.

Specimens Examined (3).— MISIONES: Parque Nacional Iguazú, 3 (CML).

Molossops temminckii (Burmeister)

Dysopes temminckii Burmeister, Systematische Üebersicht der Thiere Brasiliens, welche während einer Reise durch die Provinzen von Rio de Janeiro und Minas Geraës...gesamnelt oder beobachtat wurden von Dr. Hermann Burmeister. Pt. 1. Georg Reimer, Berlin, p. 72, 1854.

Molossops temminckii: Miller, Bulletin of the United States National Museum, 57:248, 1907.

Type Locality.— Brazil, Minas Gerais, Lagoa Santa.

Distribution.— This species is restricted to a narrow strip from central Venezuela, Colombia, and eastern Peru, to Bolivia, expanding to include almost all of central and southern Brazil, northern Argentina, Paraguay, and western Uruguay. Cabrera (1958) recognized four subspecies. One, *M. t. mattogrossensis*, subsequently has been treated as a distinct genus, a subgenus, or a different species (Freeman, 1981*a*; Honacki et al., 1982; Peterson, 1965), and is no longer recognized as a subspecies of *M. temminckii*. The taxonomic status of the remaining subspecies is unclear. The two Argentine subspecies, *M. t. temminckii* and *M. t. sylvia* (Cabrera, 1958), do not appear to be subspecifically distinct. Ibáñez and Ochoa (1985) also encountered taxonomic difficulties in Venezuelan populations, tentatively maintaining these as the subspecies *M. t. griseiventer* due to their geographic isolation from other populations.

Thomas (1924) described *M. t. sylvia* based on specimens from Goya, Corrientes Province, which he maintained were morphologically distinct from those from Paraguay or Bahia, Brazil. Thomas (1901*b*) previously had argued that specimens from Sapucay, Paraguay, although not similar in color to specimens from Goya, exhibited mainly seasonal differences. He also examined specimens from Lagoa Santa and found no trenchant morphological differences. Cabrera (1930) recognized *M. t. sylvia*, including it and the nominal

Figure 114. Skull and teeth of *Molossops neglectus*. Adult from Parque Nacional Iguazú, Misiones Province (CML 2258). Bar = 1 cm. Teeth not to scale.

subspecies, *M. t. temminckii*, in Argentina. He noted that the two subspecies could be distinguished by color; *M. t. temminckii* being dark brown, the hairs with cream bases; and *M. t. sylvia* being paler in color with the hairs white basally. After examining Thomas' specimens in the BMNH, and large series of specimens from Argentina, Paraguay, and Bolivia in other museums, we found no differences that would support the designation of more than a single geographic race in Argentina.

We have collected this species in northwestern and northeastern Argentina and have frequently found both dark and paler individuals in each area, as well as specimens with basal hair colors in each area that are supposedly diagnostic for different subspecies. Pelage coloration is influenced by habitat and, perhaps, season, and there is much individual variation in color in this species. Cranial and external measurements of animals from across the geographic range in Argentina, Para-

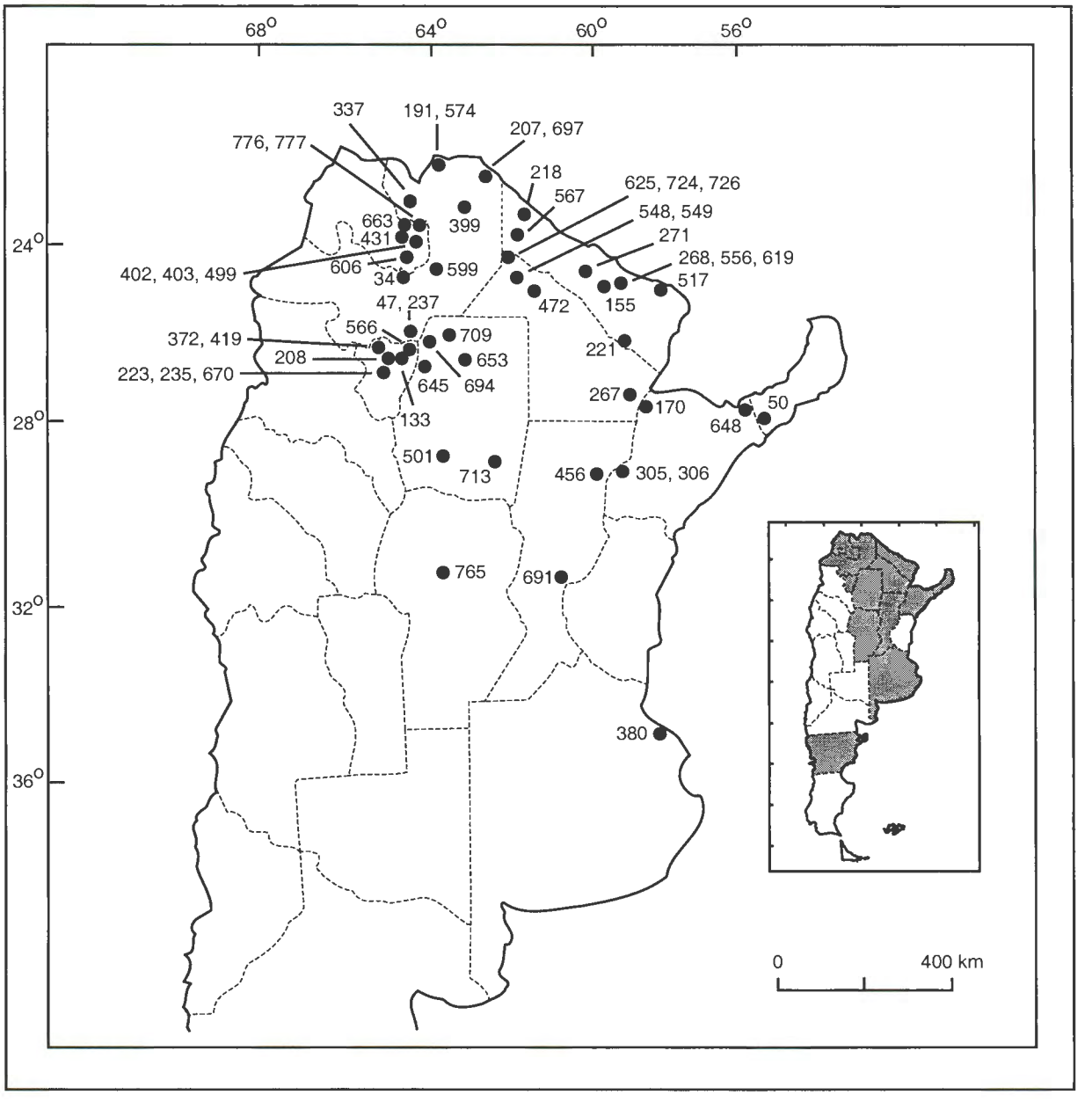


Figure 115. Map of the localities of *Molossops temminckii.*

guay, and Bolivia also fall within the range of variation expected for a species. Thus we suggest that *M. t. sylvia* is a synonym of *M. t. temminckii*. If *M. t. griseiventer* is confirmed as a valid subspecies, the specimens from Argentina would be treated as *M. t. temminckii*, and pending further systematic studies, that is how we treat them in this report.

Distribution in Argentina (Fig. 115).— Widely distributed in Argentina, although literature records indicate its presence only in the north. A specimen from "Chubut" was located in the BMNH and one collected in the city of La Plata was found in the MLP.

Description (Figs. 116 and 117).— Size is small. This is the smallest molossid in Argentina. The length of forearm ranges from 29.0 to 32.5 mm. Ears are small, triangular, and well separated. The tragus is small and triangular, about 1.4 mm high and with a wide base. The antitragus is wide and inclined slightly posteriorly.

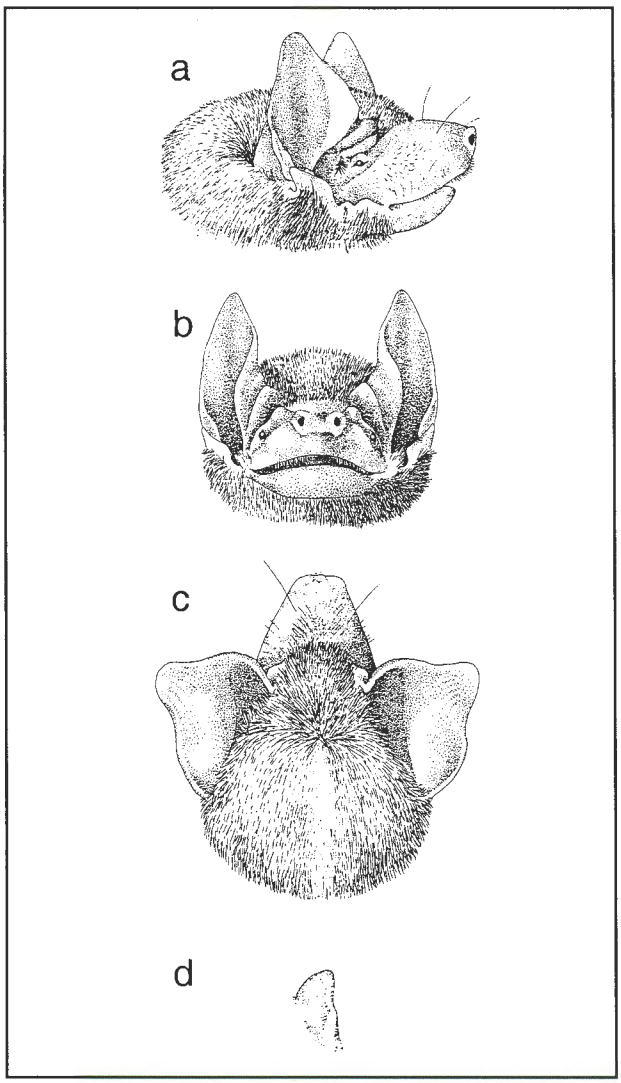


Figure 116. *Molossops temminckii*: (a) face, lateral view; (b) face, frontal view; (c) head, dorsal view; and (d) tragus.

The snout is elongated and flat. The lips are fleshy, the upper traversed by a series of short, stiff hairs. The fur is short, barely extending over the membranes, the plagiopatagium, the sides of the body, and the proximal one-half of the uropatagium. Sparse hairs are found at the posterior margin of the dorsal side of the forearm, reaching halfway to the fifth metacarpal and to the union of the fourth and fifth digits. The thumb is small, but has a well-developed pad at its base, and a sharp, curved nail. The wings attach at the midpoint of the tibia. The calcar is well developed, extending more than one-half the distance between the tail and the foot. Body color is variable, with animals from forests being darker than those from arid zones. The pelage is darker dorsally, with shades of gray predominating; hair bases are lighter and are cream or white. Pelage color varies between populations, but is uniform in individuals from the same population.

Because of its size this species can only be confused with *Cynomops planirostris*, but the differences between these taxa are pronounced and identification does not present a problem.

The skull is small but robust, widened at the mastoidal processes and anteriorly at the lacrimal furrows. The postorbital constriction is well marked. The lacrimal canals are deep. The sagittal crest is present but low, although it is more elevated posteriorly where it unites with the lambdoidal crests. The general aspect of the skull is flattened, with a slight elevation from the tips of the nasals to the back of the braincase. The tympanic bullae are small. The palate is arched, but never as much as in *Promops*. The basisphenoidal pits are not differentiated.

The dental formula is I 1/1, C 1/1, P 1/2, M 3/3, total 26. Upper incisors are procumbent and curve downward, and in contact at the base. The canines have a well-developed and extended cingulum that forms a platform on the lingual side. The P1 is well developed with a distinct protocone. The cusps of M1 and M2 form the typical "W;" the protocone is distinct, and the hypocone is obsolete; M2 is slightly larger than M1. The M3 has three commissures, with the third being small; the protocone is well developed and the hypocone is absent. The one pair of markedly bifid lower incisors, are separated from the canines by a small space. The canines are well developed, and have the internal margin of the cingulum expanded posteriorly and forming a platform that comes into contact with the anterior margin of m1. The premolars are small, and p2 is larger than p1; both are antero-posteriorly flattened and have only one cusp, wider than they are long, and are triangular in dorsal view. The molars are well developed, and decrease in size from m1 to m3; the cusps are high and sharp. m3 has a talonid composed of two cusps, the hypoconid and the entoconid, which distinguishes this species from species in the genus *Cynomops* in which there is only one cusp on the talonid.

Measurements.— Table 16.

Comments.— Information on natural history for this species in Argentina is scarce. Ojeda and Barquez

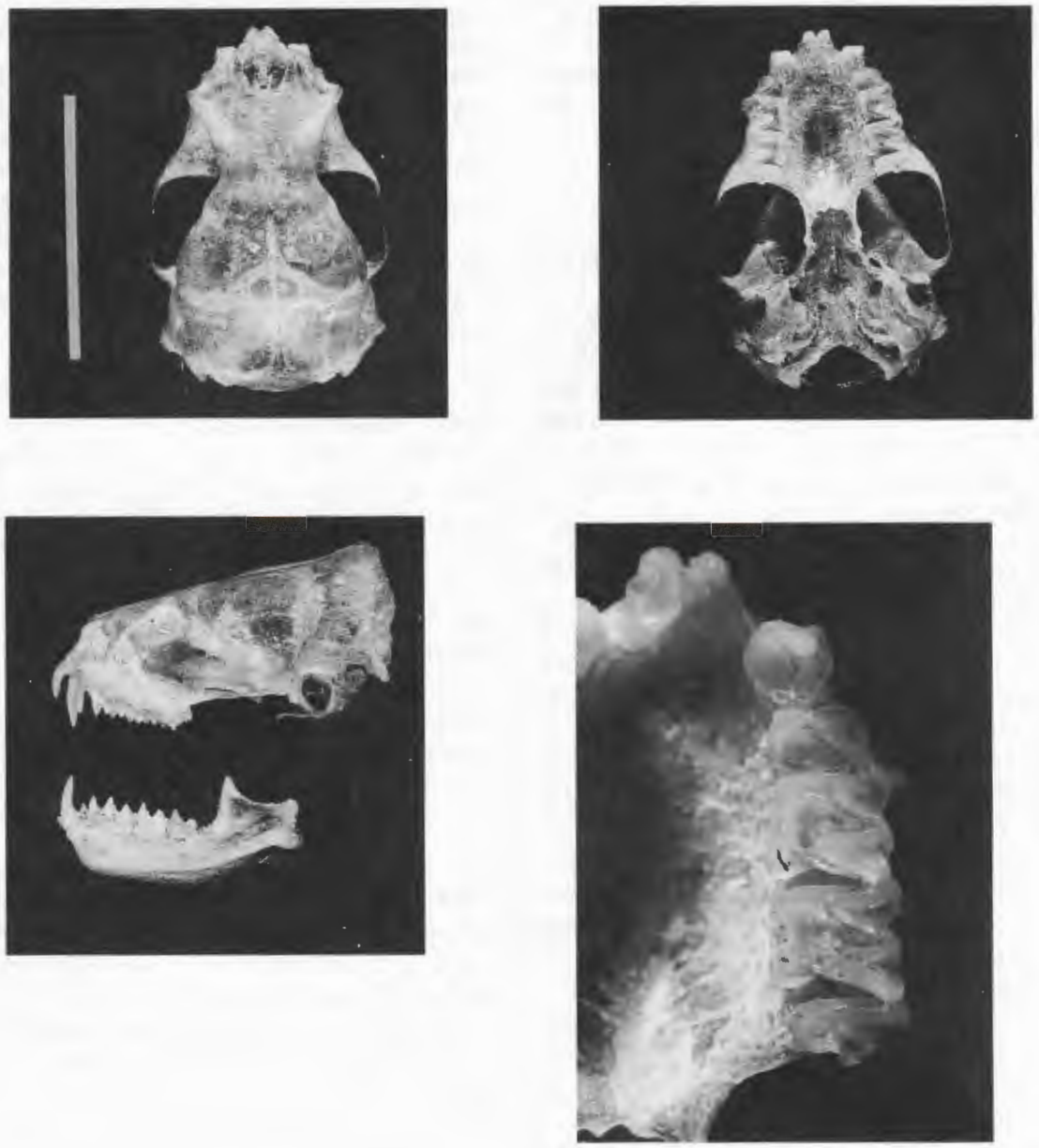


Figure 117. Skull and teeth of *Molossops temminckii*. Adult from El Cadillal, Tucumán Province (CML). Bar = 1 cm. Teeth not to scale.

(1976) reported specimens from Formosa that were captured in a forest of vinal (*Prosopis ruscifolia*), where a rich fauna of insects existed. Willig (1983) considered the species to be an aerial insectivore. Data are not known about its food preferences nor the principal components of its diet. Freeman (1981*a*, 1981*b*), based on skull characters, suggested that *M. temminckii* could be adapted to the ingestion of both soft and hard insects. Mares et al. (1981) mentioned that this is the most common species in the dry chaco of northwestern Argentina, particularly near water; they observed them flying in groups (probably feeding) in the late afternoon while it was still light. We also have observed them in the moist forest of Salta Province, flying over rivers that connect the wetter forests with the transitional forests and the chaco.

Isolated individuals may occupy human dwellings. Vizotto and Taddei (1976) found roosts in small holes in fence posts, in trees, and in an hole in a wood post. The roost openings were located at heights varying between 1-3 m, and they live in small groups of no more than three individuals.

Little information is available on reproduction. Mares et al. (1981) reported a pregnant female in November from Dique Itiyuro, Salta. We found males with scrotal testes: in mid-May at Río Porteño, 5 km S Estancia Santa Catalina, Formosa Province; and in mid-October at El Cadillal, Tucumán Province. Animals collected at Algarrobal, 20 km E General Guemes, Salta Province, were not reproductively active in late June. In the MLP, a female with two fetuses (specimens preserved in alcohol) was collected in mid-October in the city of La Plata.

Specimens Examined (166).— BUENOS AIRES: La Plata, 3 (MLP). CHACO: Estancia San Miguel, along Hwy 90, 15 km NW jct. Hwy 90 and Hwy 11, 3 (1 CML, 1 IADIZA-CM, 1 OMNH); Misión Nueva Pompeya, 4 (CML); Pozo del Gato, 1 (CML); Pozo del Gato, 3 km E Punta del Agua, 1 (CML); Río Teuco, 10 km W Tartagal, 10 (CML); Tartagal, 4 (CML). CHUBUT: Chubut, 1 (BMNH). CÓRDOBA: Villa María, 1 (CUNRC). CORRIENTES: Corrientes Capital, Barrio Lomas, 1 (CML); Goya, 1 (BMNH); Goya, 600 m, 10 (BMNH, including the type of *M. t. sylvia*); San Borgita, 4 (ROM). FORMOSA: Colonia El Pavao, 41 km N Comandante Fontana on Rd 95, 2 (CML); El Churcal, approx. 10 km SSE Buena Vista, 5 (3 CML, 2 IADIZA-CM); Estancia Santa Catalina, 5 km S, km 64, 5 (CM); Estanislao del Campo, 40 km N, 1 (ROM); Estero de Los Patos, 1 (TTU); Provincia de Formosa, 24^0 56' 59^0 12', 1 (CML); Puesto Divisadero, 35 km S, 5 km E Ing. Guillermo N. Juárez, 7 (3 CML, 3 IADIZA-CM, 1 OMNH); Río Porteño, 5 km S Estancia Santa Catalina, 3 (CML). JUJUY: Laguna La Brea, 1 (CML); Laguna La Brea, 25 km W Palma Sola, 1 (CML); Ledesma, 1 (AMNH); Río Lavayén, N de Santa Clara, sobre ruta 6, 1 (CML); Yuto, 22 (21 AMNH, 1 CML); Yuto, Río San Francisco, altura de Estación, 1 (BMNH). SALTA: Aguaray, 120 km E , 1 (CML); Algarrobal, 20 km E General Güemes, 3 (OMNH); Antilla, 1 (ROM); Dique Itiyuro, 1 (CML); El Breal, 6 km SW Santa Victoria Este, 25 (21 CM, 4 CML); El Potrero, 1 (TTU); Estancia Las Mercedes, 1 (ROM); Ingenio San Martín del Tabacal, 1 (TTU); Laguna de los Panzones, Retiro, 8 (CML); Quebrada de Acambuco, 5 km W Dique Itiyuro, 1 (CML); Río del Valle, 5 (CML); Santa Victoria Este, 1 (FCM). SANTA FE: Santa Fe, 1 (MFA). SANTIAGO DEL ESTERO: San Antonio, 4 (3 MACN, 1 TTU); San Felix, 2 (1 MACN, 1 TTU); Santa Isabel, 1 (TTU); Simbolar, 1 (TTU). TUCUMÁN: Cerro del Campo, 900 m, 2 (CML); El Cadillal, 1 (CML); El Corte, 1 (CML); El Paraíso, 1 (CML); La Higuera, 1 (CML); Las Mesadas, 3 (CML); Puesto Cortaderas, 2 (1 MACN, 1 TTU); San Miguel de Tucumán, 1 (CML).

Additional Records.—CHACO: Tartagal, 10 km al W (Barquez and Lougheed, 1990). FORMOSA: El Colorado (Massoia, 1970); Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.). JUJUY: Palma Sola, 550 m (Villa-R. and Villa-C., 1971); San Lorenzo (Thomas, 1898). MISIONES: Apóstoles (Massoia, 1980); Arroyo Urugua-í (Massoia et al., 1987); Departamento Candelaria (Massoia, 1980); Departamento Capital (Massoia, 1980). SANTA FE: Malabrigo (Yepes, 1944). SANTIAGO DEL ESTERO: Pampa Llajta (Romaña and Abalos, 1950); Tacañitas (Romaña and Abalos, 1950).

Genus *Cynomops*

Thomas (1920*a*) described the genus *Cynomops* based on its distinctive characters and included the species *planirostris*, *brachymeles*, *paranus*, *mastivus*, and *cerastes*. He differentiated it from *Molossops* by the presence of four lower incisors and simplified third upper and lower molars, the upper with two commissures and the lower with a linear posterior lobe and only one cusp. *Cynomops cerastes* was selected by Thomas as the type of the genus. Thomas (1920*a*) stated that he would naturally have selected *planirostris* as the type species of the genus, but specimens from so many localities (including Buenos Aires) had been assigned to that species that he had doubts about its exact identity. Moreover, the large-bodied *C. cerastes* (as a representative of the genus that contains only large species) contrasted better with the small-bodied *Molossops temminckii* than would the mid-sized *Molossops planirostris*.

With the large numbers of specimens now available for comparisons among species and with additional

Table 16. Measurements of Molossops neglectus *and* Molossops temminckii. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Molossops neglectus*	*Molossops temminckii*
Total length	82.6 ± 4.86, 3 77.0 - 85.8	76.5 ± 5.01, 33 60.0 - 84.0
Tail length	29.6 ± 2.05, 3 28.3 - 32.0	27.8 ± 3.41, 32 21.0 - 34.0
Hindfoot length	6.8 ± 0.40, 3 6.4 - 7.2	5.7 ± 0.90, 28 4.5 - 7.0
Ear length	12.6 ± 0.80, 3 11.9 - 13.5	13.0 ± 1.64, 33 10.0 - 15.3
Forearm length	36.9 ± 0.10, 3 36.8 - 37.0	31.0 ± 0.83, 45 28.9 - 32.5
Weight	11.0 ± 0.70, 2 10.5 - 11.5	6.2 ± 0.90, 25 5.0 - 8.0
Condylobasal length	14.3 ± 0.17, 3 14.2 - 14.5	13.0 ± 0.39, 42 12.1 - 13.8
Least interorbital breadth	6.4 ± 0.26, 3 6.1 - 6.6	5.7 ± 0.26, 47 5.0 - 6.3
Zygomatic breadth	10.2, 1 8.3 - 9.3	8.8 ± 0.25, 19
Greatest length of skull	14.9 ± 0.20, 3 14.7 - 15.1	13.4 ± 0.32, 40 12.7 - 14.1
Postorbital constriction	4.7 ± 0.05, 3 4.7 - 4.8	3.7 ± 0.16, 46 3.4 - 4.1
Breadth of braincase	8.3 ± 0.05, 3 8.3 - 8.4	7.1 ± 0.18, 40 6.8 - 7.6
Length of maxillary toothrow	6.2 ± 0.10, 3 6.1 - 6.3	5.3 ± 0.19, 47 4.8 - 5.7
Palatal length	6.7 ± 0.17, 3 6.5 - 6.8	5.9 ± 0.22, 37 5.5 - 6.4
Mastoidal breadth	9.4 ± 0.25, 3 9.2 - 9.7	8.3 ± 0.35, 38 7.7 - 9.3
Length of mandibular toothrow	6.4 ± 0.11, 3 6.3 - 6.5	5.8 ± 0.21, 41 5.4 - 6.3
Length of mandible	11.7 ± 0.20, 3 11.5 - 11.9	10.1 ± 0.30, 37 9.5 - 10.8
C-C (width across canines)	4.3 ± 0.28, 3 4.2 - 4.7	3.7 ± 0.16, 44 3.4 - 4.1
M-M (width across molars)	7.2 ± 0.10, 3 7.1 - 7.3	6.4 ± 0.21, 45 6.0 - 6.8

species having been described, size is no longer a diagnostic characteristic. For example, *Molossops neglectus* can be larger than *Cynomops planirostris* or some specimens of *C. paranus*. We consider *C. paranus* a valid species and not a subspecies of *C. planirostris*. Thus we include in Argentina three species of this genus: *C. abrasus*, *C. paranus*, and *C. planirostris*.

Cynomops abrasus (Temminck)

Dysopes abrasus Temminck, Monographies de Mammalogie, ou descrition de quelques genres de mammifères, dont les espéces ont été observées dans les différens. Musées l'Europe. C. C. Vander Hoek, Leiden, 1:232, 1826.

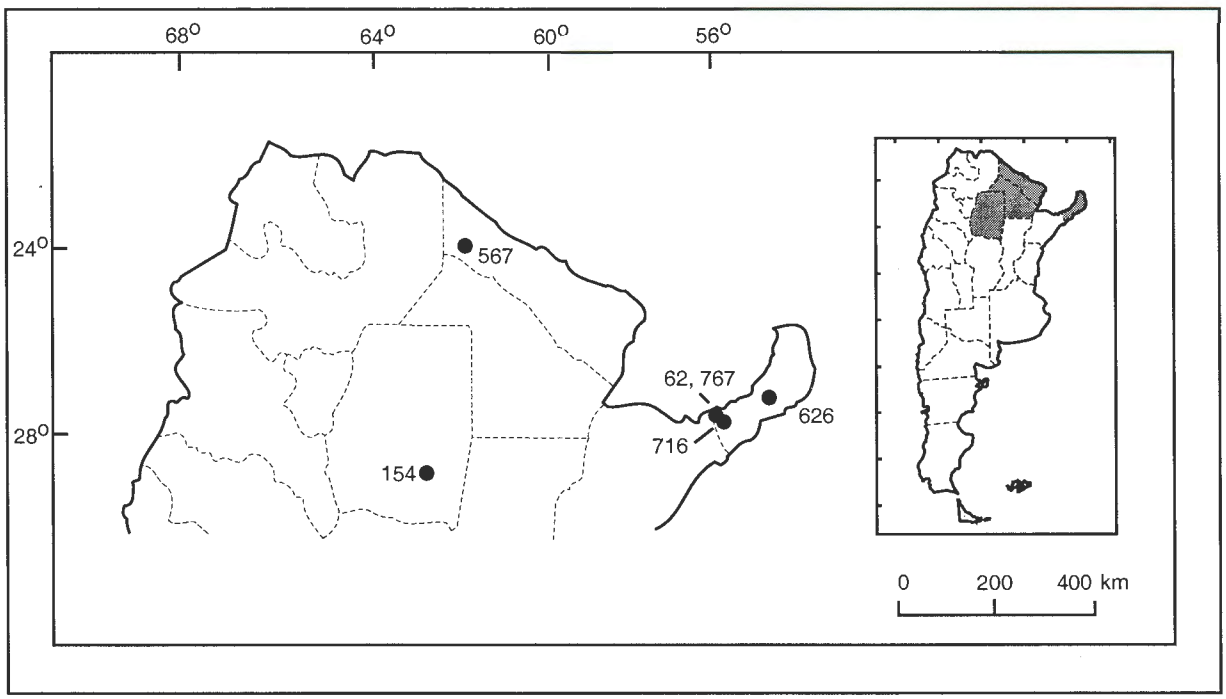


Figure 118. Map of the localities of *Cynomops abrasus*.

Cynomops brachymeles: Thomas, Annals and Magazine of Natural History, ser. 9, 5:189, 1920.

This species was treated as a member of *Cynomops* by Barquez (1987) and Barquez et al. (1993). Most authors have considered *Cynomops* to be a subgenus of *Molossops* and have used the nomenclatural combination *Molossops* (*Cynomops*) *brachymeles* for this species. Recently, *abrasus* has been used rather than *brachymeles*, based on Carter and Dolan (1978; see also Husson, 1962; Koopman, 1993). Apparently the type of *Molossus* (*Molossops*) *brachymeles* Peters, 1865, has been lost (Carter and Dolan, 1978). However, the original description indicated the presence of one pair of lower incisors, which is not characteristic of *Cynomops*. Based on external measurements, the type specimen could belong to any one of several molossid genera. It is possible that the two small lower incisors fell out when the skull was cleaned and before it was studied by Peters, but this cannot be proven without an examination of the lost type. Consequently, the type of the large species of *Cynomops* should be *Cynomops abrasus* Temminck, 1827.

Type Locality.— Brazil.

Distribution.— Probably widely distributed, but known records are restricted to the forests of the Guianas, Suriname, Venezuela, Colombia, Peru, Brazil, Bolivia, Paraguay, and northeastern Argentina. Although recognition of distinct subspecies is problematic, at present the populations from Argentina can be treated as *C. a. cerastes* (Thomas).

Cynomops abrasus cerastes (Thomas)

Molossus cerastes Thomas, Annals and Magazine of Natural History, ser. 7, 8:440, 1901.

Cynomops cerastes: Thomas, Annals and Magazine of Natural History, ser. 9, 5:189, 1920.

Type Locality.— Paraguay, Villa Rica. According to Carter and Dolan (1978), this locality is probably the same as Villarica, in the province of Guaira.

Distribution in Argentina (Fig. 118).— Cabrera (1930, 1958) reported this species in the provinces of Formosa, Chaco, and Misiones. Yepes (1944) included it in Colonia Dora, Santiago del Estero Province, but we have not found the specimens.

Description (Figs. 119 and 120).— Thomas (1901*b*), in the original description, stated that this species was similar to *M. planirostris*, but much larger. This

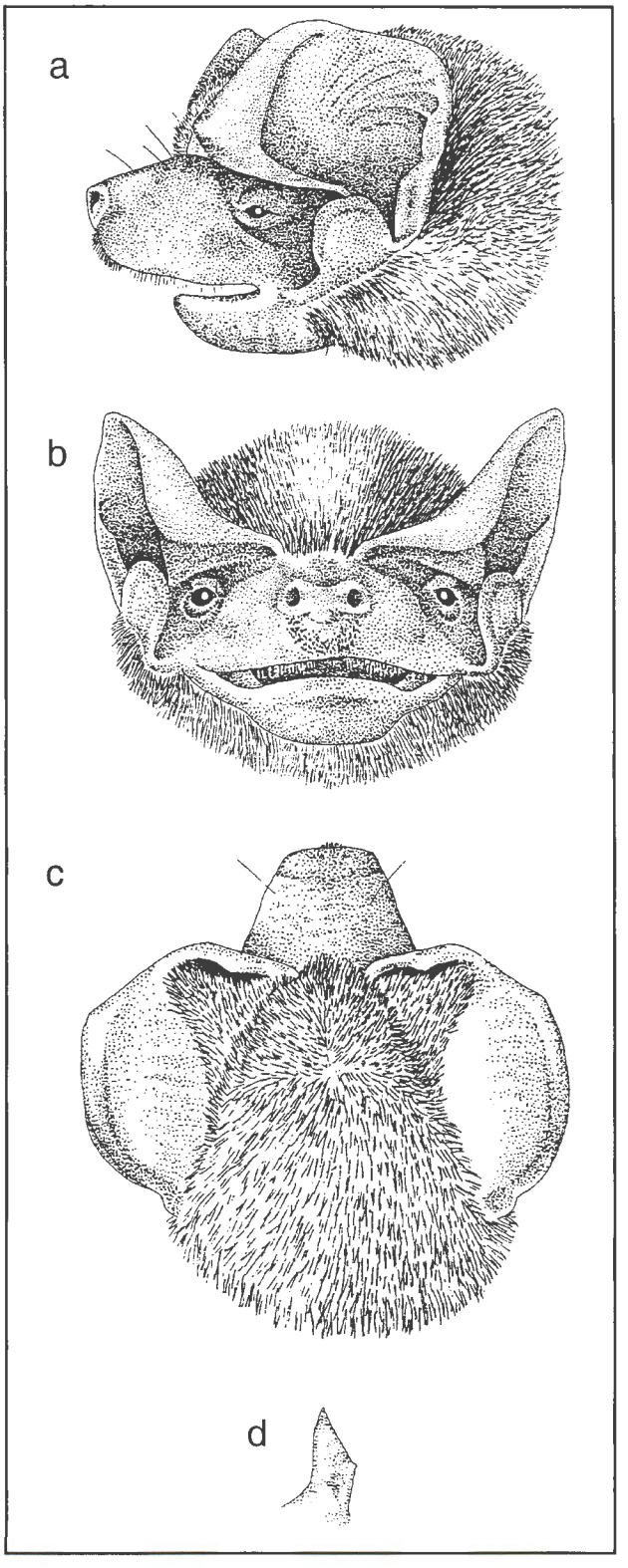


Figure 119. *Cynomops abrasus*: (a) face, lateral view; (b) face, frontal view; (c) head, dorsal view; and (d) tragus.

is the best characterization of the species since it represents a "giant" form of the *Molossops-Cynomops* group, with a length of forearm greater than 40 mm. Specimens from Misiones Province generally agree with Thomas' description. All have a cinnamon reddish-brown dorsum and a paler venter. The rostrum, ears, and wing membranes are dark, almost black. Ventrally, the pelage extends to the sides of the body; dorsally it extends over the basal portion of the uropatagium and over the uropatagium. A fringe of hairs borders the forearm and the metacarpals. The muzzle is elongated and the mouth broad; the upper lip has a fringe of long and soft hairs; the lower lip is almost naked. The space between the nares and the margin of the upper lip is covered with stiff, recurved bristles. The nares are large and open forward and outward. The ears are triangular with rounded tips; they insert in the middorsal region of the snout, the points of insertion separated by a 2.0 to 2.5 mm space; the inner area of the ear has a distinct keel; perpendicular to the keel are seven to nine parallel furrows. The tragus is triangular, its margins almost straight and the outer margin slightly convex with a small pointed basal lobe. The antitragus is well developed, square in shape, and with rounded borders; the posterior margin is elevated above the anterior one. The uropatagium is short and the tail is included in it for more than one-half of its length; the calcar is well developed. This species is comparable in size to *Molossus ater*, but *M. ater* has a distinct keel along the middorsal surface of the snout that is absent in *Cynomops*.

The skull is robust, broad, and flat, and is especially broad at the lacrimal processes and the mastoids. The infraorbital foramen opens at the lower part of the deep lacrimal furrow between the walls of the rostrum and the lacrimal crests. The sagittal crest is barely visible in females, but is better developed in males. The lambdoidal crests are low. The zygomatic arches are thin, especially medially. The palate is concave its posterior margin projecting beyond the last molar; the caudal spine is absent; hamular processes of the pterygoids are well developed and elevated to the height of the anterior portion of the glenoid fossa. The tympanic bullae are small and hardly cover more than one-half of the cochlea. The basisphenoid fossae are absent. The paraoccipital processes are well developed and project posteriorly beyond the external margin of the occipital condyles.

The dental formula is I 1/2, C 1/1, P 1/2, M 3/3, total 28. Upper incisors are strong, slightly procumbent,

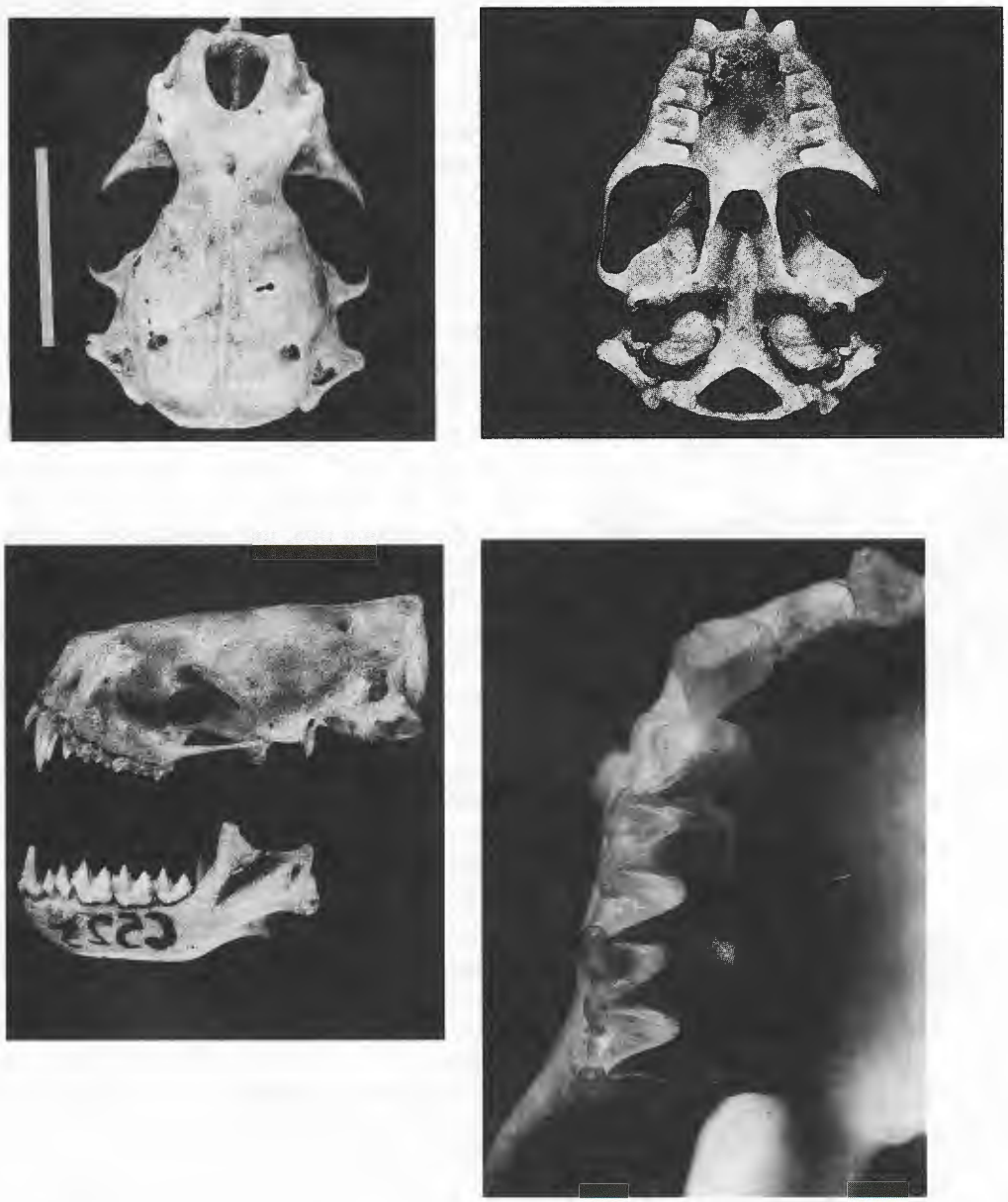


Figure 120. Skull and teeth of *Cynomops abrasus*. Adult female from Villa Miguel Lanus, Misiones Province (CML 5325). Bar = 1 cm. Teeth not to scale.

and curved in lateral view, in contact at the bases but separated at the tips; they do not completely fill the space between the canines. The canines are strong and robust, with a sharp labial edge and a posteriorly projecting cingulum that is in contact with the anterior middle region of the upper premolar. The upper premolar has two cusps, a normal paracone and a low, but sharp protocone. The M1 and M2 have "W"-shaped cusps, a well-developed protocone, and an obsolete but visible hypocone. M3 is reduced with only two commissures formed by the parastyle, paracone, and mesostyle; the protocone is present but low. The i1 is strongly bilobed and i2 is reduced; the incisors fill the space between the canines. The cingula of the canines project posteriorly forming a channel. The p1 and p2 are small, p2 larger than p1, and with its inner posterior margin projecting

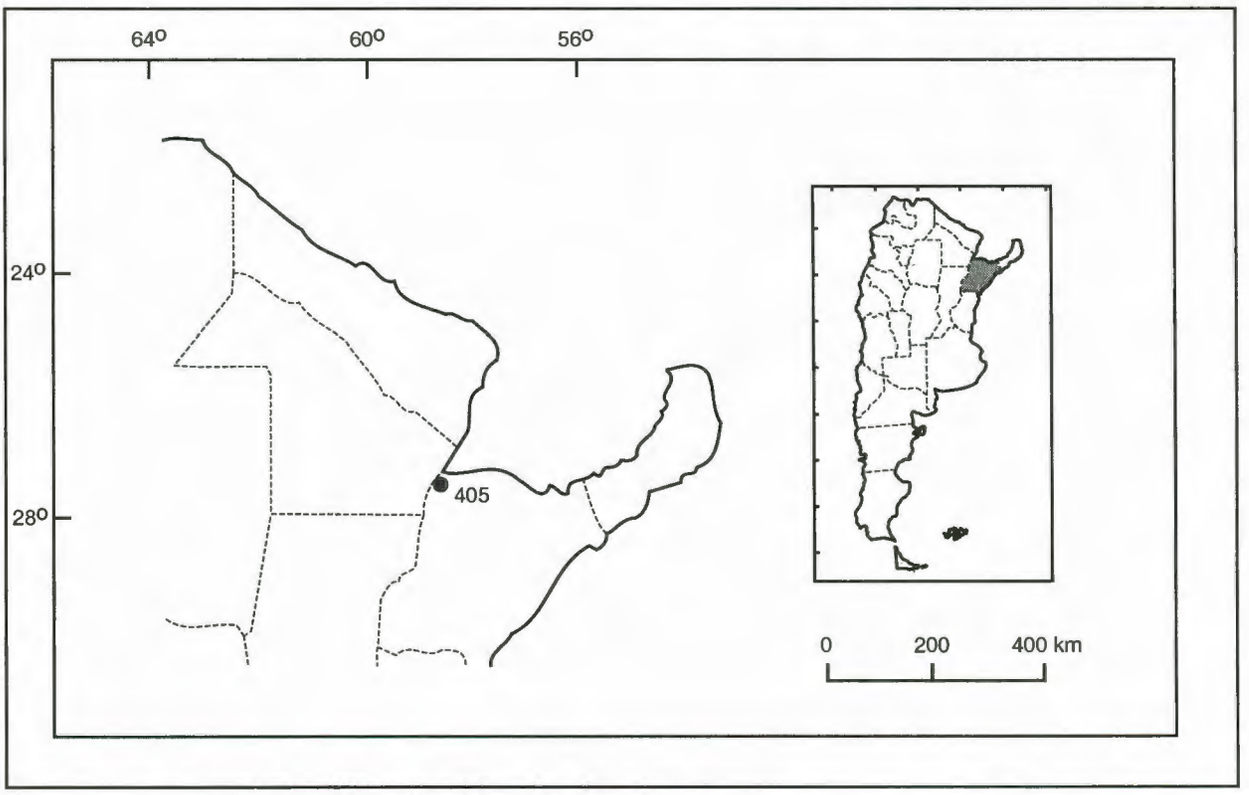


Figure 121. Map of the localities of *Cynomops paranus*.

posteriorly so that the paraconid of the m1 is mounted over it. The m1 and m2 are normal, with the talonid and trigonid well developed, whereas m3 has a reduced talonid and a single cusp, the hypoconid.

Measurements.— Table 17.

Comments.— Ecological data for this species in Argentina are scarce, but they indicate a preference for the humid forests of Misiones Province, across the swamplands of Corrientes Province, and into the chacoan thorn scrub of western Formosa Province; a female captured in the winter month of July in western Formosa was not breeding (Mares et al., 1995). In Paraguay, Myers and Wetzel (1983) captured a pregnant female in October and noted that individuals were not reproductively active in August.

Specimens Examined (6).— FORMOSA: Puesto Divisadero, 35 km S, 5 km E Ing. Guillermo N. Juárez, 1 (OMNH). MISIONES: Arroyo Zaimán, 1 (CEM); Río Victoria, 1 (CEM); Tacuaruzú, 1 (MACN); Villa Miguel Lanús, 2 (1 CEM, 1 CML).

Additional Records.— CHACO: Provincia de Chaco (Cabrera, 1930). FORMOSA: Provincia de Formosa (Cabrera, 1958). SANTIAGO DEL ESTERO: Colonia Dora (Yepes, 1944).

Cynomops paranus (Thomas)

Molossus planirostris paranus Thomas, Annals and Magazine of Natural History, ser. 7, 8:190, 1901.

Cynomops paranus: Thomas, Annals and Magazine of Natural History, ser. 9, 5:189, 1920.

Thomas (1901*c*) described this taxon as a subspecies of *M. planirostris* (*M. planirostris paranus*) and noted that the new form was similar to typical *M. planirostris planirostris* in most respects. However, external and cranial characters clearly differentiate *paranus* from *planirostris*. *C. paranus* is generally darker than *planirostris* and the tips of the hairs are black, instead of brown. The color of the pale patch on the chin, chest, and belly that is strongly white in *planirostris* is less pronounced in *paranus*. In *paranus*, the ears are more separated, and the distance across the

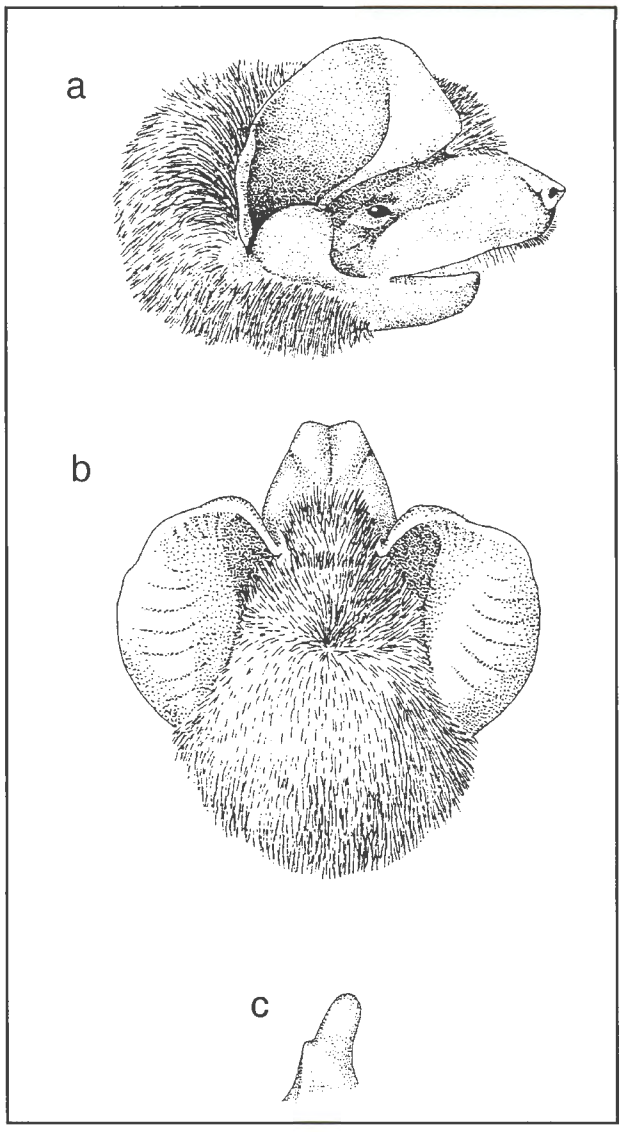


Figure 122. *Cynomops paranus*: (a) face, lateral view; (b) head, dorsal view; and (c) tragus.

lacrimal ridges is less than one-half the basal length (in *planirostris* this distance is greater than one-half). The specimen from Corrientes Province is superficially similar to *planirostris*, but agrees in all diagnostic characters with the type of *paranus* examined in the BMNH. These taxa may be sympatric, since *planirostris* has been cited from localities near those of *paranus* in Paraguay and Brazil.

Type Locality.— Brazil, Pará.

Distribution.— This species is known only from the type locality and Venezuela (Handley, 1976).

Distribution in Argentina.— Figure 121.

Description (Figs. 122 and 123).— Body size is similar to that of *Cynomops planirostris*; length of forearm is slightly larger in *paranus*, 34.5 mm in the specimen from Corrientes and 35.0 mm in the type from Para. The skull is notably larger, more robust, and wider. The tragus is longer and more rounded. These species (*C. paranus* and *C. planirostris*) are difficult to distinguish in dry skins.

Measurements.— Table 17.

Comments.— The biology of this species is practically unknown. The specimen from Corrientes was trapped in a hole in a tree.

Specimens Examined (1).— CORRIENTES: Laguna Paiva, B° Las Lomas, 1 (CML). We also examined the type from Pará, Brazil (BMNH 1.7.11.15).

Cynomops planirostris (Peters)

Molossus planirostris Peters, Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, p. 575, 1865.

Cynomops planirostris: Thomas, Annals and Magazine of Natural History, ser. 9, 5:189, 1920.

Type Locality.— French Guiana, Cayenne.

Distribution.— This species is found from Panama to northwestern Argentina, including French Guiana, Suriname, Venezuela, Colombia, eastern Peru, central and eastern Bolivia, and Paraguay.

As in the other species of *Cynomops*, subspecific designations are unclear, and some authors consider *paranus* a subspecies of *planirostris* (above). Koopman (1978) included *milleri* as a subspecies of *planirostris*. Anderson et al. (1982) assigned the subspecies *planirostris* to specimens from Bolivia. Myers and Wetzel (1983) delayed assignment of a subspecies name to Paraguayan specimens until a more comprehensive study of geographic variation was made.

Distribution in Argentina.— Figure 124.

Description (Figs. 125 and 126).— Body size is small, slightly larger than *Molossops temminckii*. Length of forearm ranges from 32.0 to 33.0 mm in the speci-

Figure 123. Skull and teeth of *Cynomops paranus*. Adult from Laguna Paiva B° Las Lomas, Corrientes Province (CML). Bar = 1 cm. Teeth not to scale.

mens examined from Argentina. Dorsal color is brown with the bases of the hairs paler, generally cream. Ventrally most specimens have a prominent pale, generally white, patch on the throat, neck, chest, and part of the abdomen. This patch varies in width, but normally is present and distinct in color from the surrounding pelage. The membranes are dark brown. The fur extends on the venter along the plagiopatagium and over the uropatagium to the sides of the tail. Dorsally, the fur extends over the basal part of the uropatagium to the sides of the forearm in the propatagium and plagiopatagium, and over the fifth metacarpal. The ears are wide and rounded. The tragus is small, higher than it is wide, has a rounded tip and, externally, has a small

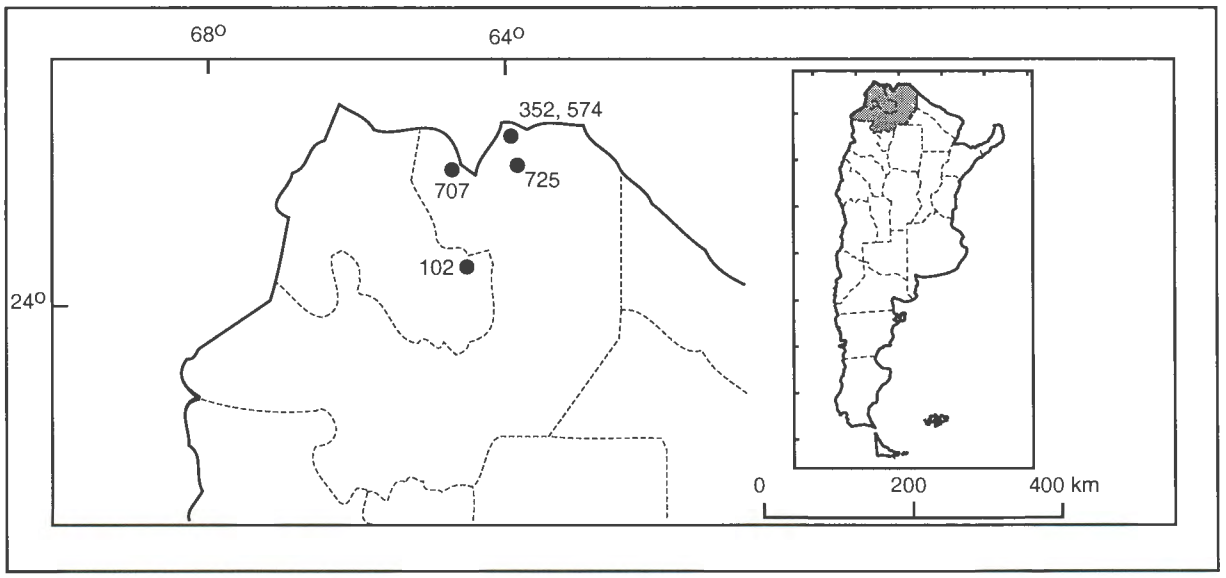


Figure 124. Map of the localities of *Cynomops planirostris*.

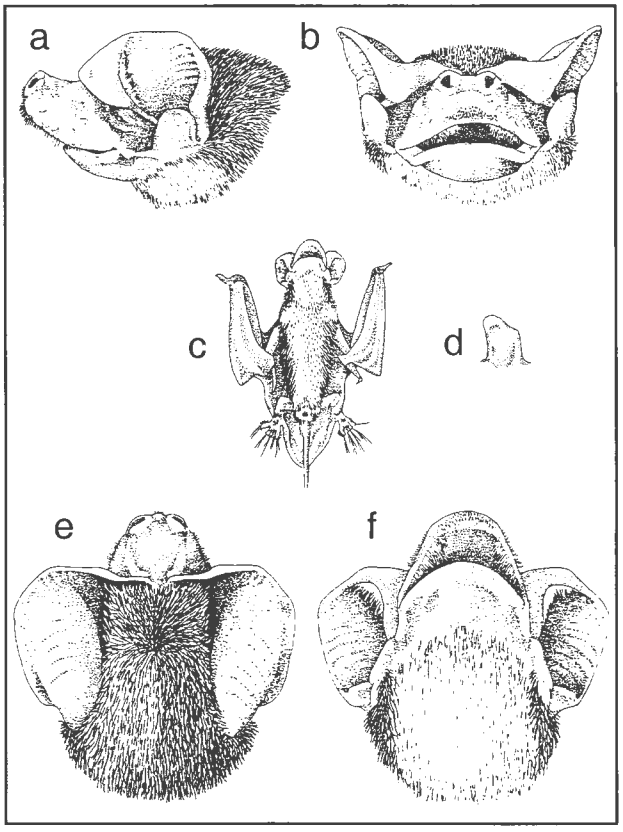


Figure 125. *Cynomops planirostris*: (a) face, lateral view; (b) face, frontal view; (c) body, ventral view; (d) tragus; (e) head, dorsal view; and (f) head, ventral view.

bump at its midpoint. The antitragus is well developed, semicircular, and extends forward as a fold of skin that reaches the corner of the mouth. The ear keel is well marked, and extends midway across the internal part of the ear. The muzzle is notably procumbent, flat, and wide. The upper lip has a fringe of fine hairs and the lower lip is naked. The calcars are long and extend for one-half the distance between the feet and tail.

The skull is similar to other *Cynomops*, but smaller, and the mastoidal processes, while present, are not as well developed as in *C. paranus*, where they project laterally from the skull. In some specimens, the posterior border of the cingulum of the upper canines does not project posteriorly, thus leaving a small space between the canines and the premolars. The teeth are similar to *C. paranus*, but the upper premolar is almost rectangular in shape (in *C. paranus* it is less rectangular). The posterior margin of the premolar is in contact with the anterior margin of the M1 in *C. planisrostris*, whereas in *C. paranus* the upper molariform teeth are generally separated by a space.

Measurements.— Table 17.

Comments.— Brosset and Charles-Dominique (1990) reported that *C. planirostris* in French Guiana had a dorsal coloration that was bright orange-brown, darker above and with a pinkish tinge below. A female

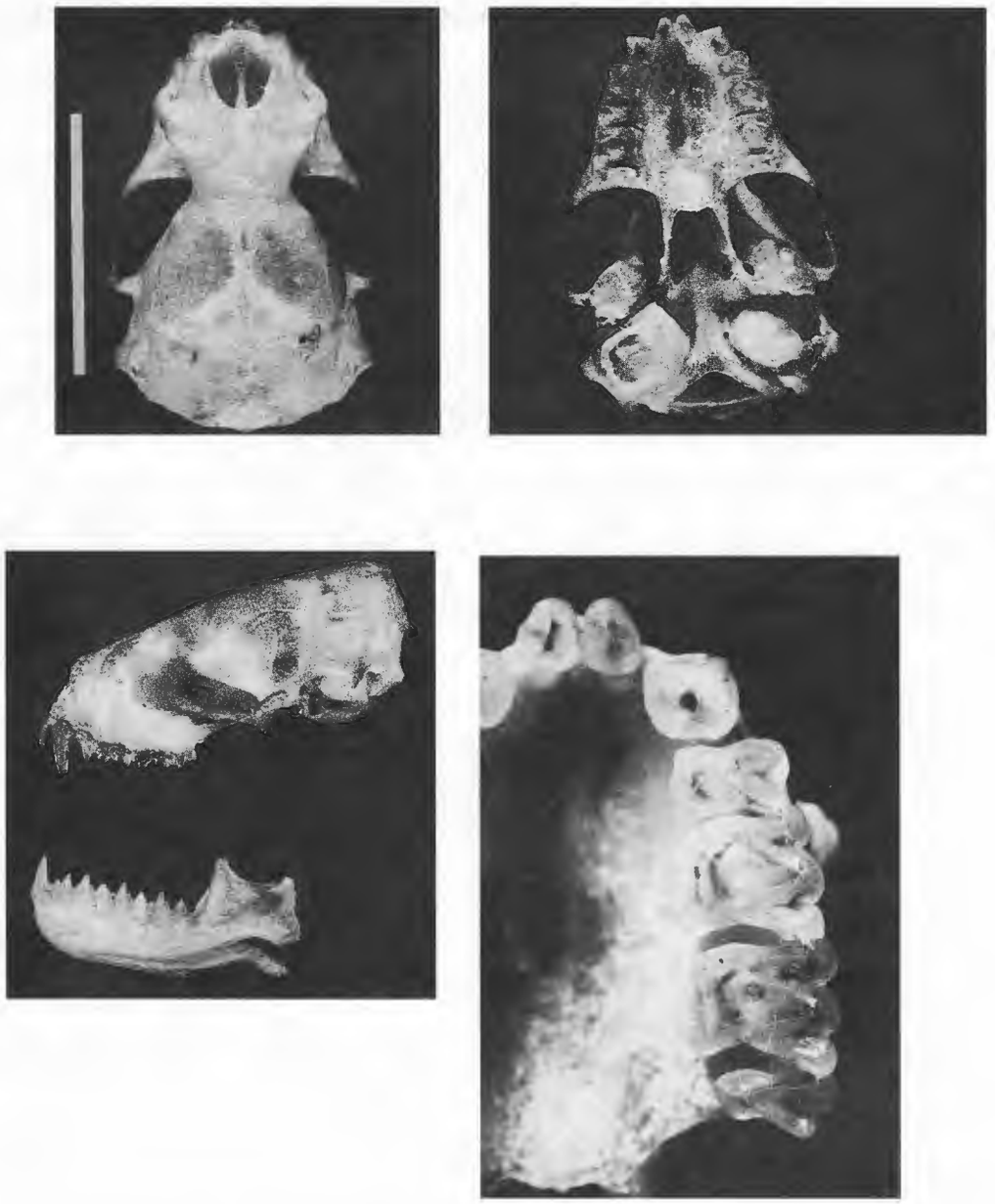


Figure 126. Skull and teeth of *Cynomops planirostris*. Adult female from Quebrada de Acambuco, 5 km W Dique Itiyuro, Salta Province (IADIZA-CM). Bar = 1 cm. Teeth not to scale.

from Dique Itiyuro, Salta Province (IADIZA-CM) had a well-developed embryo in late November. Another from the same area was captured in a net placed crossing a gully in a forest of palo blanco (*Calycophyllum multiflorum*) and petiribí (*Cordia trichotoma*) (Olrog and Barquez, 1979).

Specimens Examined (7).— JUJUY: Caimancito, 2 (MACN). SALTA: Itaú (Campo Largo), Sierras de Tartagal, 1600 m, 1 (CML); Quebrada de Acambuco, 5 km W Dique Itiyuro, 2 (1 CML, 1 IADIZA-CM); Serranía de las Pavas, 1 (MACN); Tartagal, 1 (CML).

Table 17. Measurements of Cynomops abrasus, Cynomops paranus, *and* Cynomops planirostris. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Cynomops abrasus*	*Cynomops paranus*	*Cynomops planirostris*
Total length	94.5 ± 6.36, 2 90.0 - 99.0	92.0, 1	86.0 ± 2.73, 5 83.0 - 90.0
Tail length	35.0 ± 2.83, 2 33.0 - 37.0	25.0, 1	26.6 ± 2.60, 5 24.0 - 30.0
Hindfoot length	8.8 ± 0.35, 2 8.5 - 9.0	7.0, 1	14.9 ± 1.53, 5 13.0 - 16.0
Ear length	14.0 ± 0.00, 2 14.0 - 14.0	15.5, 1	14.9 ± 1.53, 5 13.0 - 16.8
Forearm length	45.5 ± 0.71, 2 45.0 - 46.0	34.5, 1	32.6 ± 0.49, 5 32.0 - 33.0
Weight		11.5, 1 10.5 - 12.5	11.6 ± 1.04, 3
Condylobasal length	19.3 ± 0.42, 2 19.0 - 19.6	16.7, 1	15.4 ± 0.45, 5 14.7 - 15.9
Least interorbital breadth	8.5 ± 0.07, 2 8.4 - 8.5	7.3, 1	6.4 ± 0.56, 5 5.7 - 7.0
Zygomatic breadth	14.4 ± 0.50, 2 14.0 - 14.7	11.9, 1	11.2 ± 0.37, 4 10.8 - 11.5
Greatest length of skull	19.9 ± 0.50, 2 19.5 - 20.2	17.3, 1	16.1 ± 0.36, 5 15.5 - 16.5
Postorbital constriction	5.1 ± 0.35, 2 4.8 - 5.3	4.6, 1	4.1 ± 0.19, 5 4.0 - 4.5
Breadth of braincase	10.4 ± 0.21, 2 10.2 - 10.5	8.6, 1	8.0 ± 0.23, 5 7.9 - 8.5
Length of maxillary toothrow	7.8 ± 0.07, 2 7.7 - 7.8	6.8, 1	6.3 ± 0.08, 5 6.2 - 6.4
Palatal length	8.0 ± 0.00, 2 8.0 - 8.0	7.3, 1	6.5 ± 0.10, 5 6.4 - 6.7
Mastoidal breadth	13.7 ± 1.20, 2 12.8, 14.5	11.6, 1	10.1 ± 0.60, 5 9.1 - 10.6
Length of mandibular toothrow	7.4 ± 0.0, 2 7.4 - 7.4	7.5, 1	6.8 ± 0.21, 5 6.5 - 7.0
Length of mandible	15.9 ± 0.00, 2 15.9 - 15.9	13.2, 1	12.5 ± 0.23, 4 12.0 - 12.5
C-C (width across canines)	5.7 ± 0.00, 2 5.7 - 5.7	5.2, 1	4.6 ± 0.33, 5 4.1 - 5.0
M-M (width across molars)	9.4 ± 0.57, 2 9.0 - 9.8	7.8, 1	7.4 ± 0.23, 5 7.0 - 7.6

Genus *Tadarida*

This cosmopolitan genus presently contains eight species (Koopman, 1993) of which only one is found in Argentina. We do not include *Nyctinomops* in *Tadarida* and consider it to be a valid genus. Some authors treat *Nyctinomops* as a subgenus. The genus *Tadarida* was revised by Shamel (1931), who included *Nyctinomops* in *Tadarida*. Schwartz (1955) reviewed the "*brasiliensis*" group of the genus *Tadarida* and included nine subspecies, of which one, *T. b. brasiliensis* occurs in Argentina.

Tadarida brasiliensis (I. Geoffroy St.- Hilaire)

Nyctinomus brasiliensis I. Geoffroy St.- Hilaire, Annales des Sciences Naturelles, Zoologie, ser. 1, 3:343, 1824.

Tadarida brasiliensis: Thomas, Proceedings of the United States National Museum, 58:222, 1920.

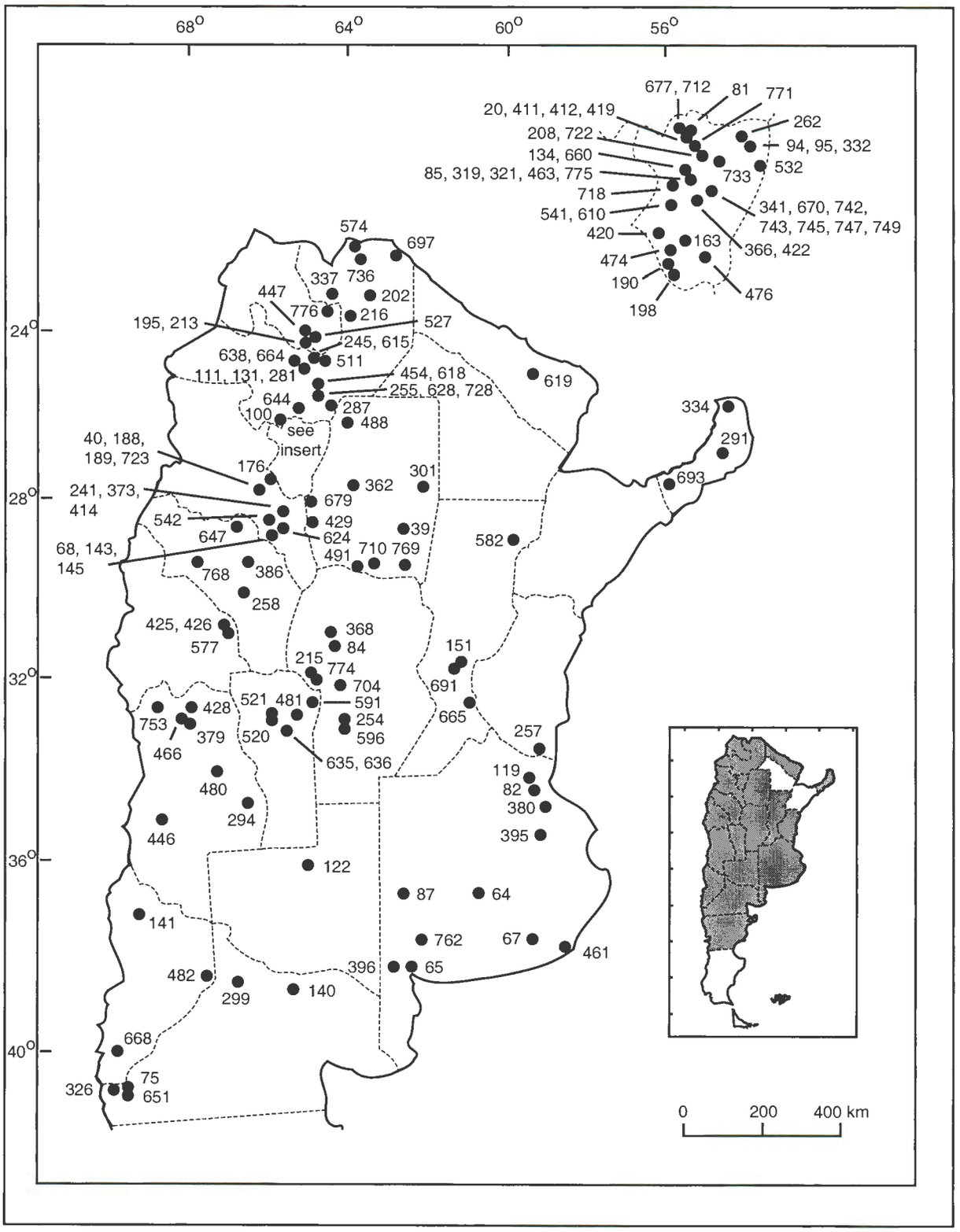


Figure 127. Map of the localities of *Tadarida brasiliensis*.

Type Locality.— Restricted to Curitiba, Paraná, Brazil, by Shamel (1931).

Distribution.— According to Koopman (1982), this species is widely distributed in South America, although records are lacking from the Amazon basin and the Guianas. It is found in northwestern Venezuela and extends southward along the slopes of the Andes in Colombia, Ecuador, and Peru, to Chile and Bolivia, southern Paraguay, southeastern Brazil, and Argentina to about 42° S.

Distribution in Argentina (Fig. 127).— This is one of the most widely distributed species in Argentina and is known from abundant records. It inhabits practically all habitat types. Although the species is relatively easy to identify, we have found many specimens in collections identified as *T. brasiliensis* that are actually *Eumops patagonicus*. Two localities cited by Fornes and Massoia (1967) for *T. brasiliensis*, Colonia Benítez and Barranqueras, Chaco Province, actually refer to specimens at TTU, FCM, and MACN; all were identified on the original tags as *T. brasiliensis* and are, in fact, *E. patagonicus*.

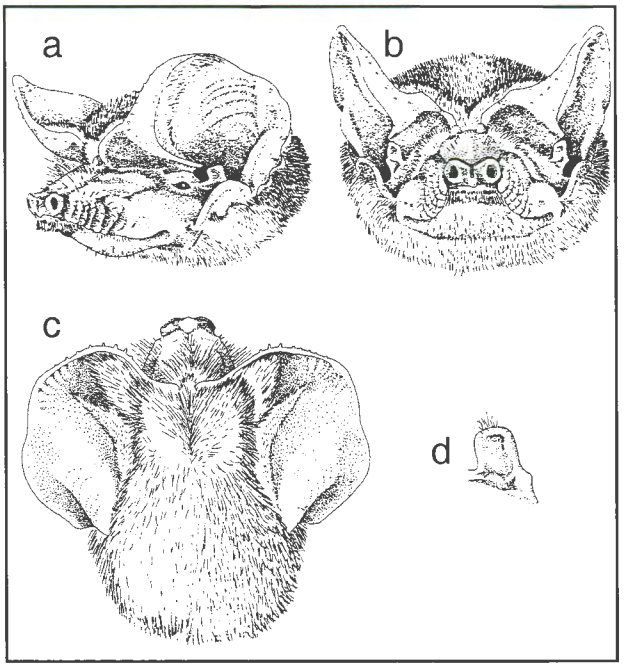


Figure 128. *Tadarida brasiliensis*: (a) face, lateral view; (b) face, frontal view; (c) head, dorsal view; and (d) tragus.

Description (Figs. 128, 129, and 133d).—Body size is medium; length of the forearm ranged from 41.8 to 45.8 mm in the specimens examined. Generic characteristics, in addition to those for the family, are: large ears with parallel furrows on the internal surface; lips with deep vertical grooves or wrinkles; a square, well-developed tragus; upper incisors well-separated basally and convergent at the tips; and the palate with a pronounced anterior emargination. The body color is variable within shades of brown and gray, some specimens are dark brown, almost black. The dorsal hairs are, in general, unicolored, occasionally with paler bases; ventrally the tips are paler. All the membranes are naked when viewed with the naked eye, but actually are covered with fine hairs, particularly the uropatagium and propatagium, on both the dorsal and ventral sides. The ears are large and rounded, do not extend beyond the anterior end of the muzzle, and are separated by a small space of 1 to 2 mm on the forehead. A marked keel is present on the inner surface of the ear. A second keel is located behind the posterior margin of the antitragus. Many dermal tubercles or spicules border the anterior margin of the ears, nine or more in each one of them. The tragus is well developed for a molossid; the antitragus is low and semicircular. The snout is pointed, the nares clearly differentiated and bordered by a series of cornified processes not easily seen without magnification. The upper lip is fleshy and marked by distinct wrinkles, its anterior extremity is diffuse and covered with a moustache of downward projecting hairs. Tufts of bristles and long hairs are found on the snout and the sides of the upper lip. The thumb is short and has a basal callosity. The feet are short and rounded, with the exterior toes having long hairs at the base of the nails. The calcars are well developed and bordered with long, thin hairs. The wings are long and narrow, and insert midway along the venter of the tibia.

The skull is flattened, but more rounded and with a shorter rostrum than *Nyctinomops*. A depression in the parietal region is evident. The rostrum is narrow and the lacrimal furrows are visible, but never as extensive as in *Cynomops* or *Molossops*. There is a second depression between the orbits that is less pronounced than the posterior depression. The sagittal crest is absent or obsolete. The lambdoidal crests are slightly developed, but are more evident in the posterolateral part of the braincase. The zygomatic arches are thin, but are widened at the middle. The palate has a strong anterior emargination; it is slightly arched and projects posteri-

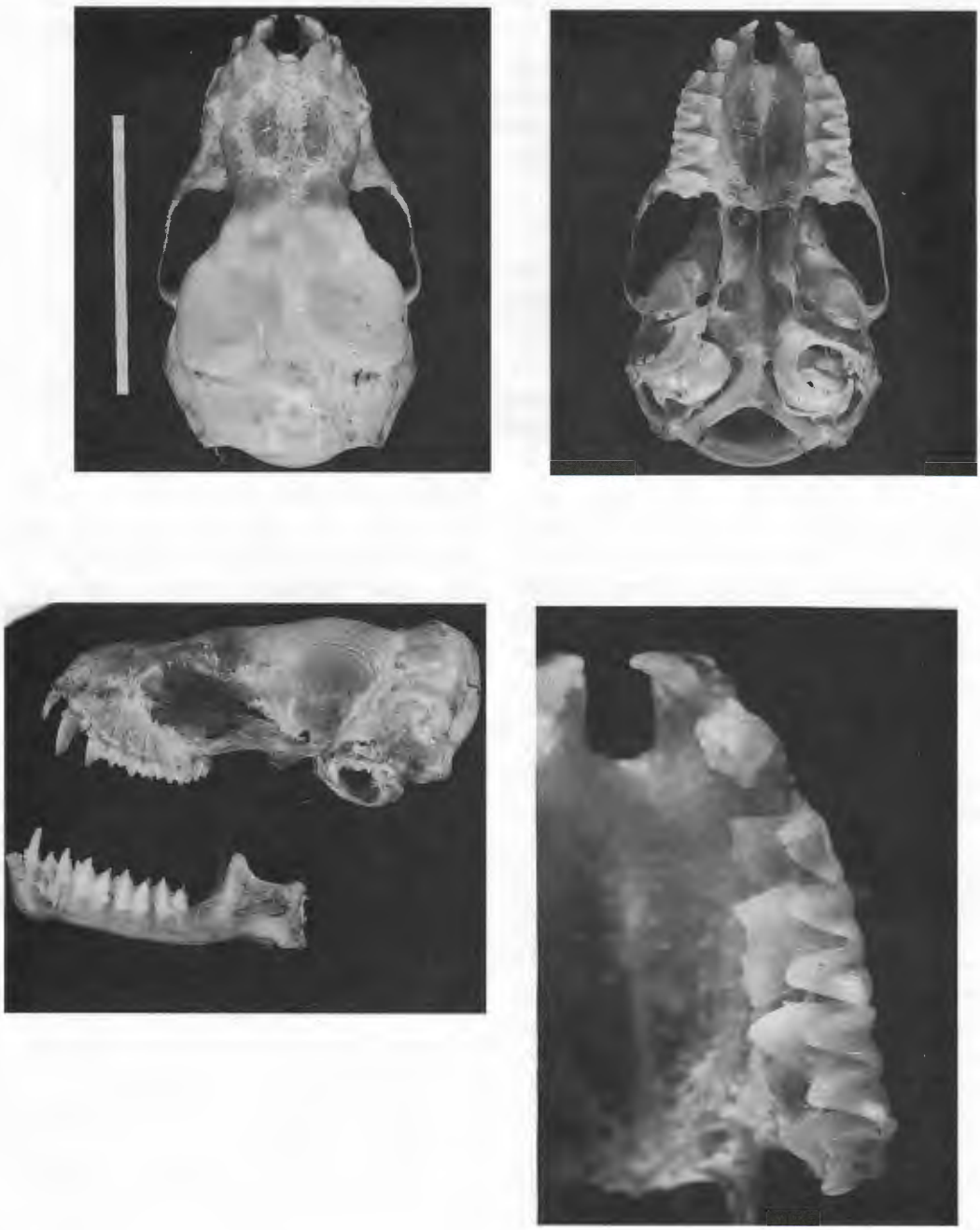


Figure 129. Skull and teeth of *Tadarida brasiliensis*. Adult female from Playa Larga, Tucumán Province (SIG 5). Bar = 1 cm. Teeth not to scale.

orly beyond the last molar. The pterygoids are thin and almost parallel. The basisphenoidal pits are shallow and located at the level of the glenoid fossae.

The dental formula is I 1/3, C 1/1, P 2/2, M 3/3, total 32. The upper incisors are convergent toward the tips, whereas in *Nyctinomops* they are nearly parallel. The canines are long and pointed. The P1 is almost imperceptible, its height barely surpassing the cingulum of the canine and displaced or inclined lingually. The P2 has a high protocone. The M1 and M2 are essentially identical and have four commissures; the proto-

cone and the hypocone are well developed. The M3 has only three commissures and the hypocone is absent. The lower incisors completely fill the space between the canines; i1 and i2 are bilobed; i3 is reduced. p1 is smaller than p2, but both are small. The molars are all about the same size, and their talonids and trigonids are evident.

Measurements.— Table 18.

Comments.— This is one of the most abundant species in Argentina. It is widely distributed, extending even to the Malvinas Islands (Barquez et al., 1993). Its habits and habitats are better known than most bats because of its abundance in urban and suburban areas, and its use of dwellings and buildings as roosts. It also roosts in holes, crevices, and tunnels, and large colonies may develop in caves. In the southern United States some summer colonies may consist of as many as 20 million individuals (Davis et al., 1962). Kunz (1982) suggested that those that form small groups in buildings and below bridges return to the roosts during the night, whereas those that inhabit caves do not. Emergence time coincides with dusk, and annual variation in emergence time increases with latitude (Erkert, 1982). The return to the roost is conditioned by several factors, including climate, success in obtaining food, and distance from the roost to the feeding area.

Freeman (1979) listed the insects found in the stomachs of 88 specimens of *T. brasiliensis*; lepidopterans (95% of the stomach contents), hymenopterans, coleopterans, and homopterans were dominant. Other studies showed the presence of Lepidoptera, Coleoptera, Diptera, Odonata, Hemiptera, and Neuroptera (Bailey, 1931; Freeman, 1979, 1981*b*; Grinnell, 1918; Ross, 1961, 1967; Sherman, 1939; Storer, 1926). Ross (1967) noted that this species feeds in groups of 10 to 13 individuals, with a tendency to ingest insects that fly in swarms (this is known as filter feeding). Silva and Fleck (1976) found large quantities of insects in the stomachs of this species, but no mosquitoes, although they were abundant in the study area. Molossids that have lips with folds fly with the mouth open and the lips expanded, forming a type of funnel that functions like the vibrissae of caprimulgid birds (Vaughan, 1966). Acosta y Lara (1950) suggested that flight speed constituted a defense against nocturnal birds of prey. We have observed owls and hawks gather at time of emergence at a bat cave containing perhaps two million or more *T. brasiliensis* in northwestern Oklahoma; as the bats emerge, and before they begin their high, fast flying, they are picked off by the avian predators. We have never observed owls gathering to feed at the dawn return of the bats to the cave, when they dive rapidly from high altitudes toward the cave entrance. They would appear to be more subject to predation by birds during their slower, more predictable flight pattern at emergence. Remains of this species have been found in owl pellets of *Tyto alba* (Acosta y Lara, 1950; Massoia et al., 1993).

A colony of 500 individuals was found in a hotel of the city of Mar del Plata, Buenos Aires, and this species has also been found in association with *Myotis* sp. and *Eumops bonariensis* (Fornes and Massoia, 1967). At the Dique Escaba in southern Tucumán Province, a colony of about 12 million *T. brasiliensis* has been protected under a national law, the first time that a bat has been given such protection (R. M. Barquez, personal observation). Reproductive activity is poorly known in Argentina. We have recorded reproductively active in specimens the city of Tucumán and a pregnant female (one fetus, CRL = 12 mm) at La Junta, Catamarca, in October. Reproductively inactive individuals were collected in February and March in La Cumbre, Córdoba, and in April in Parque Nacional El Rey, Salta Province.

Specimens Examined (502).— BUENOS AIRES: Azul, 1 (IADIZA-CM); Bahía Blanca, 1 (BMNH); Balcarce, 1 (MSU); Bonifacio, F. C. Sud, 5 (BMNH); Capital Federal, 1 (MACN); La Plata, 11 (MLP). CATAMARCA: Andalgalá, 2 (1 CM, 1 MACN); Balneario El Caolín, 6 km NW Chumbicha, 1 (OMNH); Chumbicha, 1 km N and W of balneario by road, 2,600 ft., 3 (OMNH); Chumbicha, at balneario, 2,400 ft., 3 (1 CML, 2 OMNH); Cuesta del Clavillo, 5 km S La Banderita, 2 (CML); Dique El Potrero, 31 (CM); Dique El Potrero, 13 km N Andalgalá, 1 (CML); El Rodeo, 900 m, 146 (CML); La Junta, 1600 m, 2 (CML); Las Juntas, Estancia de los Figueroa, 50 km NW Catamarca Ciudad, 3 (OMNH); Pomán, 95 km S Andalgalá near balneario, 4,400 ft., 17 (7 CML, 3 IADIZA-CM, 7 OMNH); Río San Pablo, 3 km NW Concepción, 1 (CM). CHUBUT: Chubut, 1 (MACN). CÓRDOBA: Bialet Massé, 1 (MACN); El Carrizal, Villa Dolores, 1000 m, 4 (BMNH); La Cumbre, 5 (4 CM, 1 MACN); Río Cuarto, 5 (SUVM); Yacanto, 1 (MACN). FORMOSA: Río Porteno, 5 km S Estancia Santa Catalina, 1 (CML). JUJUY: Los Perales, San Salvador de Jujuy, 1 (TCWC); Yuto, 4 (3 AMNH, 1 CML). LA PAMPA: La Pampa, 1 (MACN). LA RIOJA: Estación Patquía, Guayapa, 3

(CML); La Rioja, 1 (BMNH); San Blas de los Sauces, 4 km SE San Blas, 2 (CML); Villa Unión, 1 (MACN). MENDOZA: Gaspar Campos, 10 km N, 1 (MVZ); La Pega, 2 (IADIZA-CM); Lavalle, 1 (MACN); Los Parlamentos, 1 (MVZ); Mendoza, 27 (1 BMNH, 25 IADIZA-CM, 1 USNM); Ñacuñán, 22 (IADIZA-CM); Uspallata, 1 (MACN). MISIONES: Fracán, 2 (CML); Misiones (no specific locality), 1 (BMNH). NEUQUÉN: Chos Malal, 1 (MACN); San Martín de los Andes, 71 km SE, 2 (MVZ). RÍO NEGRO: Bariloche, 4 km W, 1 (MVZ); Chimpay, 3 (FMNH); General Roca, 1 (MACN); San Carlos de Bariloche, 4 km SW, 1 (MVZ). SALTA: Cafayate, 5 (4 BMNH, 1 MACN); Campo Quijano, 2 (TTU); Cerrillos, 2 (MACN); El Chaguaral, 1 (CML); El Zapallar, Finca Las Tres Marías, 2 (MD); Finca Santa Cruz, 3 km N Las Mercedes, 1 (CML); Ingenio San Martín del Tabacal, 1 (TTU); Parque Nacional El Rey, 4 (CM); Quebrada de Acambuco, 5 km W Dique Itiyuro, 1 (RAO); Río Mojotoro, Puente del F.C. Belgrano, 1 (MD); Río Piedras, 600 m, 1 (BMNH); Salta Capital, 1 (TTU); San Antonio, 2 (TTU); San Lorenzo, 1 (MACN); Santa Victoria Este, 1 (MACN); Tonono, 1 km E sobre Río Itiyuro, 1 (CML). SAN JUAN: Las Tumanas, along Hwy 510 at crossing of Río Tumanas, 3 (1 CML,1 IADIZA-CM, 1 OMNH); Las Tumanas, Río Tumanas, 4 (1 CML, 1 IADIZA-CM, 2 OMNH); Quebrada del Arroyo Astica, 8 km W Astica, 1 (MACN). SAN LUIS: Paso del Rey, 1 km N, along Arroyo de la Cañada Honda, 3 (1 CML, 1 IADIZA-CM, 1 OMNH); Paso del Rey, 9 km N, 1 (OMNH); Rincón de Papagayos, 2 km E Papagayos, 11 (2 CML, 3 IADIZA-CM, 6 OMNH); Saladillo, 1 (TCWC); Saladillo, Río Quinto, 9 (2 MACN, 7 TTU). SANTA FE: Colastiné Sur, 1 (MFA); Reconquista, 1 (MFA); San Lorenzo, 1 (TTU); Santa Fe, 1 (MFA). SANTIAGO DEL ESTERO: Lavalle, Estancia El Salvador, 3 (1 MACN, 2 TTU); Nueva Esperanza, 1 (MACN). TUCUMÁN: Agua Rosada, San Pedro de Colalao, 1 (CML); Benjamín Paz, 1 (CML); Biological Reserve at Horco Molle, 3 (1 IADIZA-CM, 2 OMNH); Burruyacú, 1 (TTU); Burruyacú, Iglesia, 5 (MACN); Cerro San Javier, 1 (CML); Concepción, 10 (4 BMNH, 1 FMNH, 5 MACN); Dique Escaba, 1 (CML); Dique San Ignacio, 17 (CML); El Cadillal, 1 (CML); Estancia El Cavao, 1 (CML); Horco Molle, Biological Reserve, 1 (IADIZA-CM); Horco Molle, Residencia Universitaria, 3 (CML); Iglesia, 3 (TTU); Instituto Lillo, San Miguel de Tucumán, 2 (CML); Las Juntas, 22 km W Choromoro on Hwy 312, 3,500 ft., 5 (3 IADIZA-CM, 2 OMNH); Las Mesadas, 2 (CML); Las Pavas, 5 (MACN); Las Talas, 4 km al N de Bella Vista, 2 (OMNH); Marcos Paz, 1 (CML); Piedrabuena, 5 (2 MACN, 3 TTU); Playa Larga, Río Los Sosa, Ruta 307 km 19.7, 1 (PIDBA); Río Los Sosa, Ruta 307, km 19.7, camino a Tafí del Valle, 750 m, 3 (OMNH); San Javier, 1 (CML); San Miguel de Tucumán, 7 (CML); San Pedro de Colalao, 2 (CML); Tacanas, 2 (CML); Tafí del Valle, 1 (PIDBA); Tapia, 1 (CML); Timbó Nuevo, 3 (TTU); Tucumán, 5 (3 BMNH, 2 CML); Tucumán, 370 m, 1 (CML); Tucumán, 450 m, 2 (USNM); Tucumán, Hotel Savoy, 2 (USNM); Vipos, Estancia San Pedro, 2 (CML).

Additional Records.— BUENOS AIRES: Bernal (Fornes and Massoia, 1967); Laguna Chascomús (Massoia and Pardiñas, 1989); Laguna Chasicó (Contreras, 1973); Mar del Plata (Fornes and Massoia, 1967); Villa La Ventana (Massoia et al., 1993). CATAMARCA: Tapso (Romaña and Abalos, 1950). CHUBUT: Península de Valdés (Daciuk, 1974). CÓRDOBA: Espinillo (Tiranti and Torres, 1998); Paso del Durazno (Tiranti and Torres, 1998); Río Cuarto (Tiranti and Torres, 1998); Segunda Usina (Tiranti and Torres, 1998). ENTRE RÍOS: Estación Paranacito (Fornes and Massoia, 1967). ISLAS MALVINAS: Islas Malvinas (Hill, 1988). JUJUY: Dique La Ciénaga, casa del club náutico, 30 km SSW San Salvador de Jujuy, 1000 m (Villa-R. and Villa-C., 1971); El Carmen (Yepes, 1944); Perico (Yepes, 1944). LA PAMPA: Carro Quemado (Santis and Justo, 1978). MISIONES: Iguazú, cerca de las Cataratas del Iguazú (Villa-R. and Villa-C., 1971); Santa Inés (Massoia, 1980). NEUQUÉN: Neuquén (Villa-R. and Villa-C., 1971). RÍO NEGRO: Golfo San Matías (Cabrera, 1958); Hotel Llao Llao (Villa-R. and Villa-C., 1971). SALTA: Dragones (Yepes, 1944); Estación Baños (Romaña and Abalos, 1950); Finca La Cruz, 28 km SSE Salta (Villa-R. and Villa-C., 1971); Lumbrera (Yepes, 1944); Rosario de La Frontera (Romaña and Abalos, 1950); Termas de Rosario de La Frontera (Romaña and Abalos, 1950). SAN LUIS: Naschel (Fornes and Massoia, 1967). SANTIAGO DEL ESTERO: Añatuya (Romaña and Abalos, 1950); El Zanjón (Romaña and Abalos, 1950); Girardet (Romaña and Abalos, 1950); La Banda (Romaña and Abalos, 1950); Ojo de Agua (Romaña and Abalos, 1950); San Pedro de Guasayán (Romaña and Abalos, 1950); Sumampa (Romaña and Abalos, 1950); Villa Unión (Romaña and Abalos, 1950). TUCUMÁN: Ingenio Lules (Romaña and Abalos, 1950); Monte Bello (Romaña and Abalos, 1950); Las Juntas, 22 km W

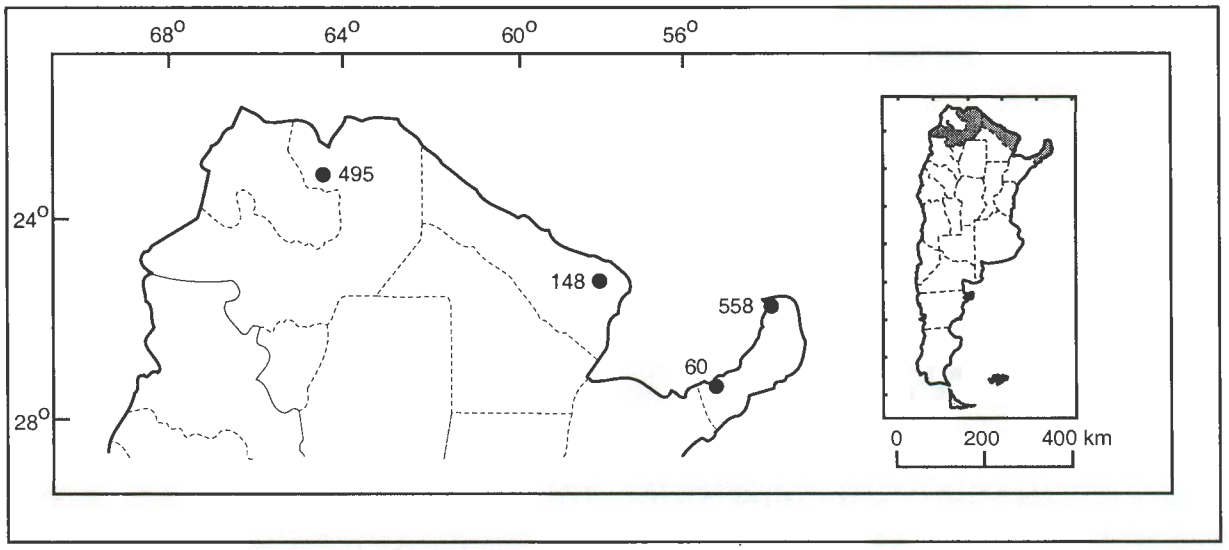


Figure 130. Map of the localities of *Nyctinomops laticaudatus*.

Choromoro (Mares et al., 1995); Monteagudo (Fornes and Massoia, 1967); Tucumán, ciudad (Romaña and Abalos, 1950); Yerba Buena (Romaña and Abalos, 1950).

Genus *Nyctinomops*

Species currently recognized in this genus previously were treated as members of the Genus *Tadarida*; some authors still maintain *Nyctinomops* as a subgenus of *Tadarida*. Freeman (1981*a*) recommended recognizing *Nyctinomops* as a valid genus. *Nyctinomops* are distinguished from species of *Tadarida* by: a fourth digit with a shorter second phalanx, ears united by a band on the forehead, the absence of i3, a more slender rostrum, a narrow anterior emargination of the palate, parallel upper incisors, and well-marked basisphenoidal pits.

Two species of *Nyctinomops* are found in Argentina, *N. laticaudatus* and *N. macrotis*. Except for their size, they are morphologically similar.

Nyctinomops laticaudatus (É. Geoffroy St.-Hilaire)

Molossus laticaudatus É. Geoffroy St.- Hilaire, Annales du Museum d'Histoire Naturelle, Paris, 6:156, 1805.

Nyctinomops laticaudatus: Miller, Proceedings of the Academy of Natural Sciences Philadelphia, 54:369, 1902.

Type Locality.— Restricted to Asunción, Paraguay, by Cabrera (1958), who considered that the original description was based on a specimen from a collection of bats from Azara. The unpublished notes of Azara (Morales Agacino, 1941) indicated that the type specimen was given by Don Ignacio Pazos, who evidently obtained it in his own house in Asunción.

Distribution.— The species occurs from northwestern Peru, western and eastern Colombia, Venezuela, the Guianas, and Suriname, through most of Brazil, Paraguay, and northern and eastern Bolivia to northwestern and northeastern Argentina.

Distribution in Argentina (Fig. 130).— In Argentina, this species has been reported only for the provinces of Formosa (Barquez and Ojeda, 1975), Salta (Mares et al., 1981), and Misiones (see Additional Records). Barquez and Ojeda (1975) contained a number of errors and the published measurements are corrected here (measurements in parenthesis are those that appeared in the publication): total length, 107 (107); tail, 47 (43); forearm, 43.1 (43.1); ear, 21 (21); condylobasal length, 19.7 (16.6); least interorbital width, 4.2 (0.42); postorbital constriction, 3.7 (not given); zygomatic width, 10.5 (11.3); total length of skull, 18.0 (12.2); width of braincase, 8.9 (0.89); upper toothrow, 5.4 (0.54); length of palate from behind the posterior emargination, 6.8 (0.68); length of mandible, 12.9 (19.2); basal length, 15 (13.8).

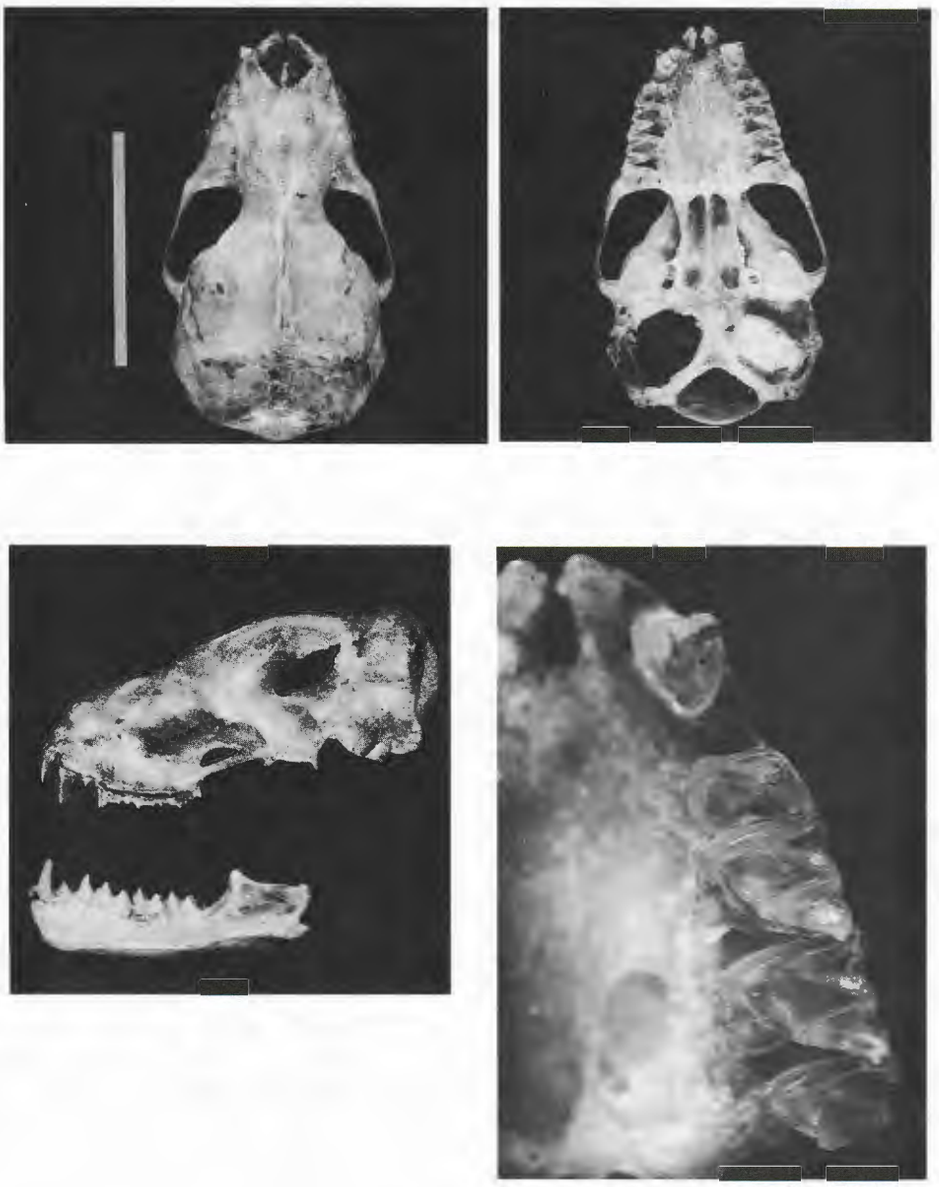


Figure 131. Skull and teeth of *Nyctinomops laticaudatus*. Adult male from 13 km S Clorinda, Formosa Province (CML 1913). Bar = 1 cm. Teeth not to scale.

These errors in publication may have led Myers and Wetzel (1983) to consider this specimen as *T. brasiliensis*. With the exception of a smaller forearm, the measurements given by Myers and Wetzel (1983) for specimens of *N. laticaudatus* from Paraguay and Bolivia are larger than those of the specimen from Formosa; in the specimen from Salta Province, the forearm is similar to those from eastern Paraguay and from Tarija, Bolivia. Anderson et al. (1982) considered the Bolivian specimens as *T. l. europs* and, although the Tarija locality is geographically close to Salta, the subspecific status of the specimens from Argentina cannot be resolved without examining a greater number of specimens.

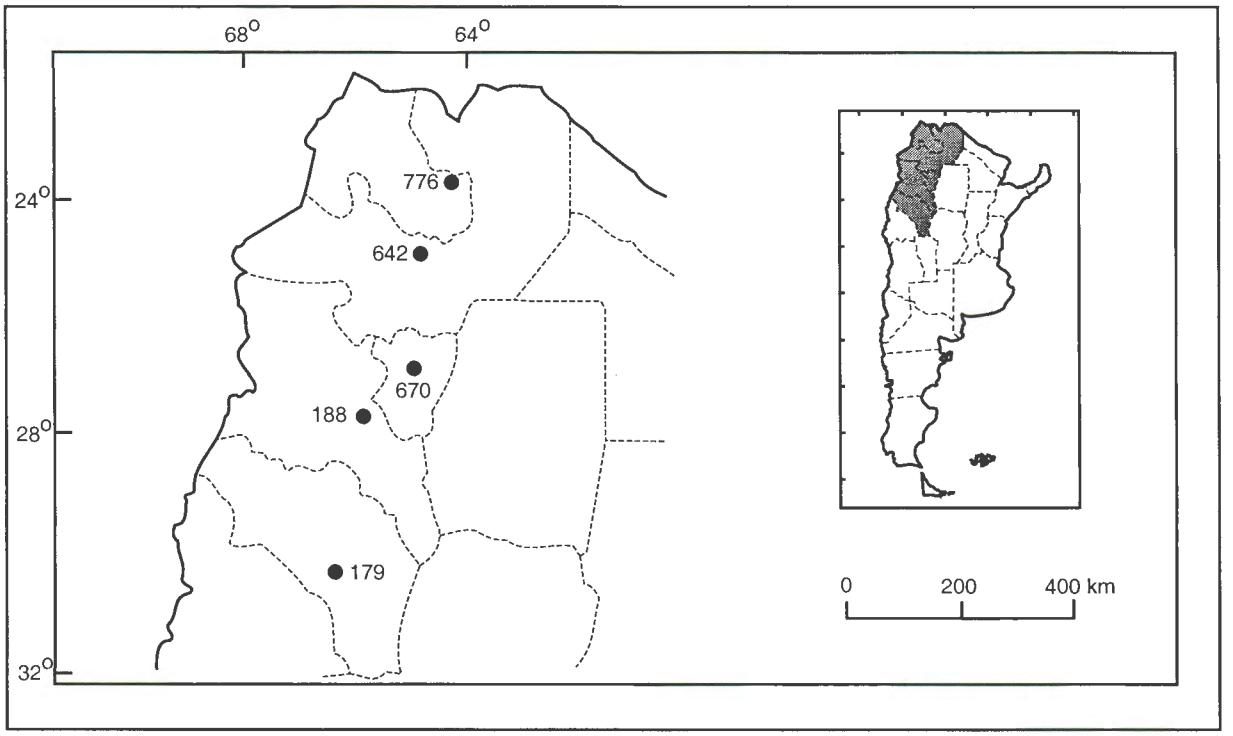


Figure 132. Map of the localities of *Nyctinomops macrotis*.

Description (Fig. 131 and 133c).— *Nyctinomops laticaudatus* is similar to *N. macrotis*, but smaller. *N. laticaudatus* may be confused with *T. brasiliensis*, but is distinguished from it by the ears that are connected, and the shorter second phalanx of the fourth finger. The color is dark brown.

The dental formula is I 1/2, C 1/1, P 2/2, M 3/3, total 30. The skull is similar to *N. macrotis*, but the interorbital region is shorter and comparatively wider in *N. laticaudatus*, and the basisphenoidal pits are shallower. In the specimens from Formosa Province, the upper incisors are more nearly parallel than in those of *N. macrotis* from Tucumán and Salta provinces, and i1 is shorter than i2 and is not bilobed.

Measurements.— Table 18.

Comments.— Habitat and habits are almost unknown for Argentina. This species is known to be preyed upon by Stygian owls (*Asio stygius*) in the cerrado of Brazil (Motta Junior and Taddei, 1992). The specimen from Salta Province was captured in the forest and that from Formosa Province in swampy chacoan vegetation of palms with low brush.

Specimens Examined (2).—FORMOSA: Clorinda, 13 km al S, sobre ruta 11, 1 (CML). SALTA: Orán, 15 km S, 15 km W, along Río Santa María, 1 (CM).

Additional Records.— MISIONES: Arroyo Yabebyri, entre Loreto y el Arroyo Yabebyri, sobre ruta 12 (Massoia et al., 1989*d*); Puerto Aguirre (=Puerto Iguazú) (Vaccaro, 1992).

Nyctinomops macrotis (Gray)

Nyctinomus macrotis Gray, Annals of Natural History, ser. 11, 4:5, 1839.

Nyctinomops macrotis: Miller, Proceedings of the Academy of Natural Sciences Philadelphia, 54:393, 1902.

The name of this species has been cited in different forms by different authors, mainly in the combinations *Nyctinomus molossus*, *Tadarida molossa*, or *T. molossus*. Apparently, the use of these names has been due to the fact that authors considered that the original description of this form corresponded to *Vespertilio*

molossus Pallas. Husson (1962) explained his arguments for the use of the name *macrotis* and summarized the synonyms that should be adopted for *Molossus molossus* Pallas and *Tadarida macrotis* (Gray). The proper generic name is *Nyctinomops*.

Type Locality.— Cuba.

Distribution.— In South America, it is absent only from western Peru, southwestern Bolivia, Chile, and most of Argentina. The southernmost localities are in Uruguay, in the Río de la Plata, and in the Río Tacuarembó (Gonzalez, 1977), which is why Koopman (1982) probably included it to the south of the Río de la Plata in Argentina.

Distribution in Argentina.— Figure 132.

Description (Figs. 133a, 133b, and 134).— This is the largest species of *Nyctinomops*, with the length of the forearm ranging from 58.2 to 62.6 mm. Color is variable. Specimens from Tucumán and Salta provinces are very dark, the membranes almost black, whereas the specimen from La Rioja Province is lighter (brown) and has paler wing membranes. The bases of the hairs are generally white or cream and paler than the tips.

The venter is paler than the dorsum. The pelage extends only slightly over the membranes, although there is some hair on the propatagium bordering the forearm, on the metacarpal of the fifth finger, and on the wide dactylopatagium in the area of union of the phalanges. Some hair also is found on the margin of the calcars, on the inner surface of the ear to the sides of the keel, and on the membrane between the ears. Ears are very large, extending beyond to the tip of the snout when laid forward, their margins convex to semicircular; a series of four or five dermal tubercles or spicules are located on their anterior border. The keel of the ear is well developed. The tragus is small and square, similar to that of *T. brasiliensis*, but proportionally smaller. The antitragus is semicircular and longer than it is high. The snout is wide, with the nares opening toward the sides. The upper lip has the deep folds or wrinkles characteristic of the genus and a dense moustache. Abundant hairs cover the snout. The upper border of the nares is traversed by a series of cornified processes as in *T. brasiliensis*. The wing membranes are narrow and insert at about the midpoint of the tibia. The free portion of the tail is longer than the portion included in the uropatagium. The calcars are well developed, and the feet and thumbs are similar to those of *T. brasiliensis*.

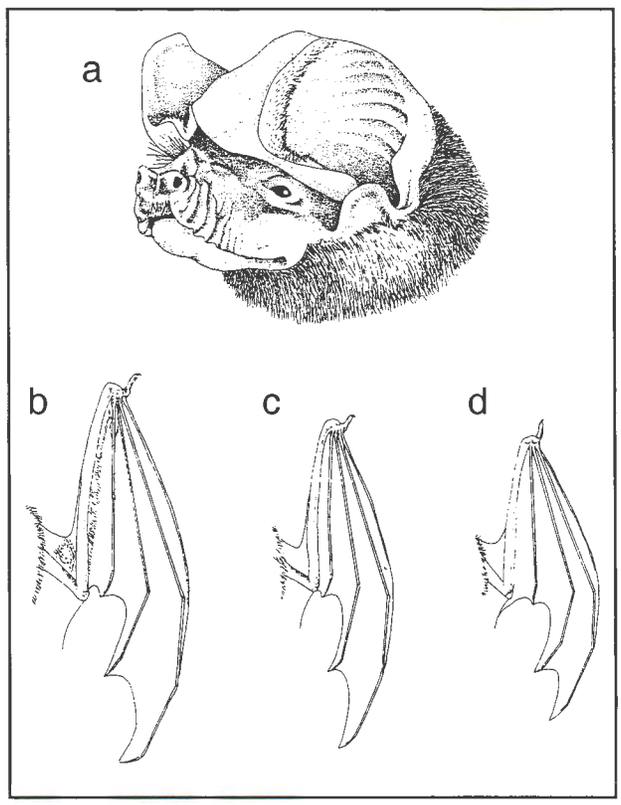


Figure 133. Lateral view of face of: (a) *Nyctinomops macrotis*; and comparison of the forearms and wings of (b) *Nyctinomops macrotis*; (c) *Nyctinomops laticaudatus*; and (d) *Tadarida brasiliensis*.

The skull is elongate, has a narrow rostrum, and barely widens at the lacrimal processes. The part of the skull between the lacrimal process and the braincase is thin and tubular. The sagittal crest is low and barely distinguishable; the lambdoidal crests are poorly developed. The zygomatic arches are thin and not widened as in *T. brasiliensis*. The anterior emargination of the palate is narrow and elongate, such that the incisors are parallel instead of converging as they do in *Tadarida*. The nasals are widened anteriorly and folded downward, giving them a very distinctive appearance. The basisphenoidal pits are deep.

The dental formula is I 1/2, C 1/1, P 2/2, M 3/3, total 30. The upper incisors are thin and long, parallel or slightly inclined in some specimens, but never as much as in *Tadarida*, and are separated from the ca-

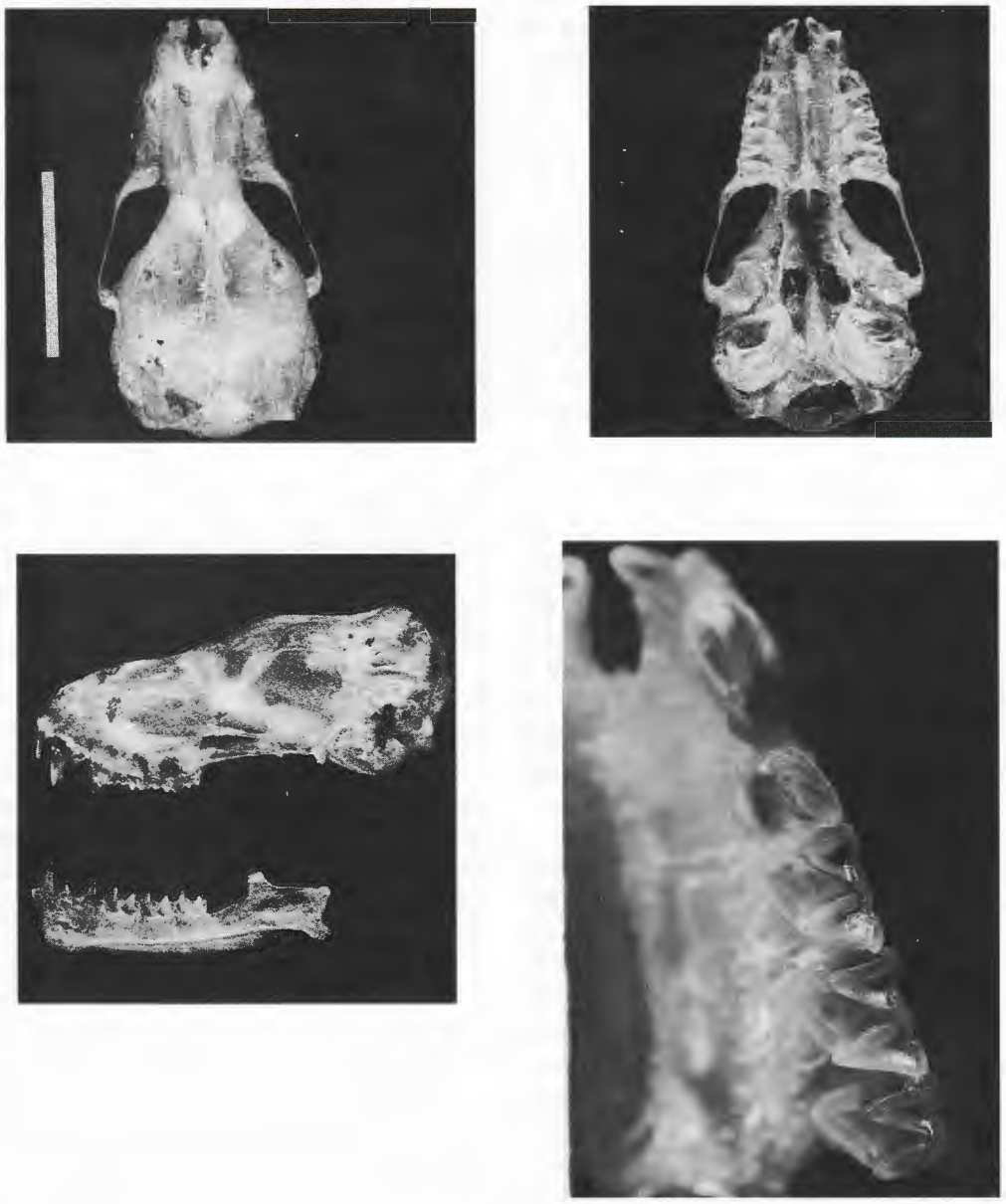


Figure 134. Skull and teeth of *Nyctinomops macrotis*. Adult female from San Miguel de Tucumán, Tucumán Province (SIG 36). Bar = 1 cm. Teeth not to scale.

nines by a wide space. The canines are thin and sharp, with a slightly grooved anterior face. The P1 is small, its crown rounded, and the point slightly inclined to the lingual side and separated from the P2 by a small diastema. The P2 has a well-developed paracone, the highest cusp of the molariform teeth. Some specimens had supernumerary P2 and p2 (Guerrero, 1985). M1 and M2 have all cusps and commissures. M3 has three commissures; the hypocone is absent. In some specimens a weak fourth commissure is evident on the last molar due to an expansion of the metacone. In the mandible, i1 and i2 are bifid and in contact with each other, thus filling the space between the canines. The other teeth are similar to *Tadarida* but larger, all with a pronounced talonid and trigonid.

Table 18. Measurements of Tadarida brasiliensis, Nyctinomops laticaudatus, *and* Nyctinomops macrotis. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Tadarida brasiliensis*	*Nyctinomops laticaudatus*	*Nyctinomops macrotis*
Total length	97.5 ± 5.79, 34 87.0 - 114.0	107.0, 1	138.9 ± 17.92, 5 126.1 - 170.0
Tail length	35.3 ± 2.92, 31 30.0 - 42.0	47.0, 1 50.9 - 54.0	52.9 ± 1.23, 5
Hindfoot length	8.7 ± 6.70, 32 6.7 - 12.0		9.9 ± 0.58, 3 9.5 - 10.6
Ear length	17.1 ± 2.46, 32 12.0 - 21.5	21.0, 1	26.8 ± 0.95, 4 25.8 - 28.0
Forearm length	43.5 ± 1.12, 38 41.8 - 45.8	43.1, 1	60.7 ± 1.62, 5 58.2 - 62.6
Weight	11.6 ± 2.35, 29 8.2 - 19.0		20.0, 1
Condylobasal length	15.8 ± 0.41, 38 15.0 - 16.9	19.7, 1	21.6 ± 0.61, 4 21.3 - 22.6
Least interorbital breadth	5.2 ± 0.53, 24 4.7 - 6.2	4.2, 1	4.4 ± 0.12, 5 4.3 - 4.6
Zygomatic breadth	9.9 ± 0.22, 34 9.4 - 10.5	10.5, 1	11.9 ± 0.37, 4 11.6 - 12.3
Greatest length of skull	16.7 ± 0.33, 38 16.0 - 17.6	18.0, 1	22.9 ± 0.64, 4 22.4 - 23.9
Postorbital constriction	4.0 ± 0.11, 39 3.8 - 4.3	3.7, 1	3.9 ± 0.08, 5 3.8 - 4.0
Breadth of braincase	8.4 ± 0.18, 39 8.1 - 8.8	8.9, 1	10.2 ± 0.24, 4 10.0 - 10.5
Length of maxillary toothrow	6.1 ± 0.14, 39 5.9 - 6.5	5.4, 1	8.6 ± 0.19, 5 8.4 - 8.9
Palatal length	6.7 ± 0.19, 35 6.3 - 7.0	6.8, 1	8.6 ± 0.27, 5 8.4 - 9.1
Mastoidal breadth	9.3 ± 0.23, 36 8.9 - 9.9		11.6 ± 0.24, 4 11.4 - 11.9
Length of mandibular toothrow	6.5 ± 0.19, 39 6.2 - 7.0		9.2 ± 0.31, 5 9.0 - 9.7
Length of mandible	11.6 ± 0.31, 38 11.0 - 12.5	12.9, 1	16.2 ± 0.39, 5 15.7 - 16.8
C-C (width across canines)	4.2 ± 0.21, 38 3.7 - 4.7		4.6 ± 0.15, 5 4.4 - 4.8
M-M (width across molars)	7.0 ± 0.21, 37 6.2 - 7.3		8.2 ± 0.25, 5 7.9 - 8.6

Measurements.— Table 18.

Comments.— The biology of this species is almost unknown, especially in Argentina. Specimens mentioned by Guerrero (1985) were captured from a building in the city of Tucumán, where it is quite common. This species is generally captured in natural habitats. Fornes (1964) collected individuals in fissures in a cave in La Rioja Province.

Little is known about the diet. Ross (1967), Easterla and Whitaker (1972), and Freeman (1979) reported a large proportion of lepidopterans, mainly Sphingidae, but also Grillidae, Tettigonidae, Formicidae, Pentatomidae, unidentified coleopterans, Cercopidae, and Cicadellidae as food items.

Little information is available on reproduction. Specimens from Tucumán Province were not reproduc-

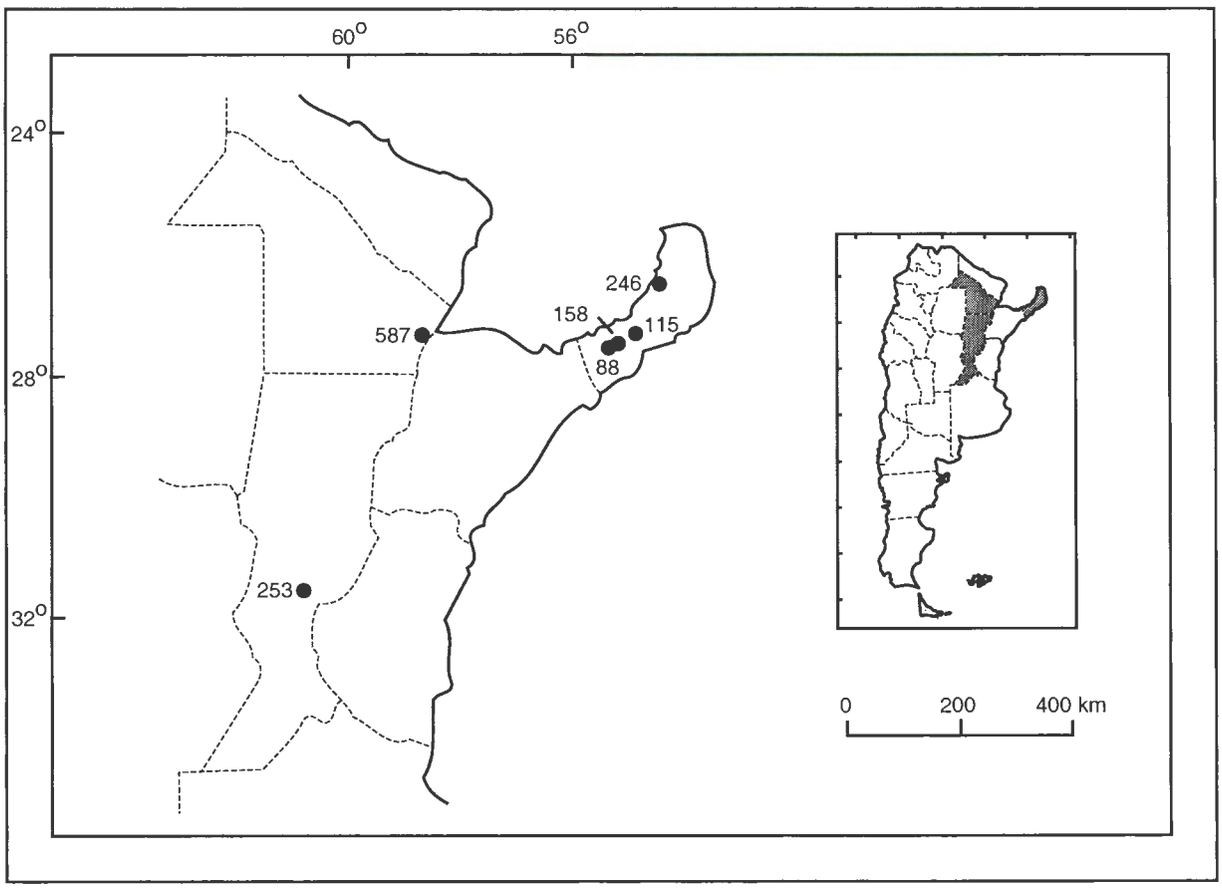


Figure 135. Map of the localities of *Eumops auripendulus*.

tively active in May and June; the individuals from Dique El Potrero, Catamarca Province, were young with cartilaginous phalanges and were captured at the beginning of May. This species is known to be preyed upon by Stygian owls (*Asio stygius*) in the cerrado savanna of Brazil (Motta Junior and Taddei, 1992).

Specimens Examined (8).— CATAMARCA: Dique El Potrero, 1 (CM). JUJUY: Yuto, 1 (MACN). LA RIOJA: Cueva del Chacho, Patquía, 1 (CML). SALTA: Salta, Parque San Martín, 1 (SIG). TUCUMÁN: San Miguel de Tucumán, 4 (3 CML, 1 SIG).

Genus *Eumops*

This New World genus contains the largest number of molossid species in Argentina and they vary greatly in form and size. Eger (1977) recognized nine species, including *E. trumbulli*; later, Freeman (1981*a*) treated *trumbulli* as a subspecies of *E. perotis*. We recognize *E. auripendulus*, *E. bonariensis* (excluding *E. patagonicus*), *E. dabbenei* (including *E. underwoodi mederai*), *E. glaucinus*, *E. patagonicus* (including *E. bonariensis beckeri*), and *E. perotis*.

Species of *Eumops* occupy many habitats in Argentina. In addition to being common in cities, especially around human dwellings, buildings, and bridges, they also occupy natural refuges such as caves, cracks in rocks, and trees. The altitudinal range of *Eumops* is wide and some species can be found up to 3000 m (Eger, 1977).

Miller (1906) characterized this genus by its slender skull, cylindrical interorbital region, and undifferentiated sagittal crest. Later (Miller, 1907) noted that *Eumops* is identified easily by its general nyctinomine form, slightly arched palate, and strongly projecting upper incisors that completely fill the space between the canines. These characteristics do not fit all species, however. If *Nyctinomops macrotis* is considered as a typi-

cal nyctinomine, some species are comparable and others are not. Procumbent upper incisors also are seen in the genus *Promops*, but its palate is strongly arched, its rostral region is notably shorter, and its braincase higher. Some species of *Eumops* could be confused with either *Tadarida* or *Nyctinomops*, but the lips of *Eumops* are smooth and lack the deep wrinkles characteristic of the other two genera.

Eumops has been revised by Sanborn (1932), Eger (1977), and Freeman (1981*a*), but few Argentine specimens were included in these studies so that the status of some species and subspecies remains uncertain.

Eumops auripendulus (Shaw)

Vespertilio auripendulus Shaw, General Zoology or systematic natural history, G. Kearsley, London, 1(1):137, 1800.

Eumops auripendulus: Goodwin, American Museum Novitates, 1994:5, 1960.

This species is poorly known in Argentina. Two subspecies were recognized by Eger (1977): *E. a. auripendulus* from central Bolivia to northern South America and Central America; and *E. a. major* along the coast of eastern Brazil, southern Paraguay, and northeastern Argentina. The Bolivian subspecies likely extends into northwestern Argentina where it could be confused with *E. glaucinus*. *E. auripendulus* is dark blackish cinnamon and its tragus is small and pointed, whereas *E. glaucinus* is pale gray cinnamon and its tragus is well developed and square. Additionally, Husson (1962) indicated that in *E. glaucinus* the small P1 is aligned in the toothrow, whereas in *E. auripendulus* it is displaced labially. However, in specimens of *E. glaucinus* from Salta and Jujuy provinces, P1 was found to be displaced labially from the toothrow, suggesting that this character also may be variable in *E. auripendulus*.

Eumops auripendulus major Eger

Eumops auripendulus major Eger, Life Science Occasional Papers, Royal Ontario Museum, 25:2, 1974.

Type Locality.— Argentina, Misiones, Campo Viera.

Distribution in Argentina.— Figure 135.

Description (Figs. 136 and 144d).—Body size is medium for the species of the genus; length of forearm ranges from 61.0 to 68.0 mm. *E. auripendulus* is similar in size to *E. glaucinus,* larger than *E. patagonicus* and *E. bonariensis*, but smaller than the other argentine species. Color is dark, blackish brown or blackish cinnamon above, and with the bases of the hairs lighter. The membranes are dark. The ears are shorter than the head and, when laid forward, do not extend beyond the tip of the snout; the ears arise at the same point on the forehead and are united at their bases). The tragus is small and pointed; the antitragus is semicircular and wider than it is high. The upper lip is smooth, without folds or wrinkles. Hair extends dorsally over the membranes bordering the forearm, over the propatagium, and to the metacarpals. Hair on the ventrum extends over the propatagium bordering the humerus. The wing membranes attach at the midpoint of the tibia. The free portion of the tail is shorter than the portion included in the uropatagium.

The skull is basically as in *E. glaucinus*, but the sagittal crest is more developed, the basisphenoidal pits are shallower (although well marked), and the M3 have only two commissures. The lacrimal process is accentuated and pointed, and the rostrum proportionally wider and shorter than in *E. glaucinus*. The dental formula is I 1/2, C 1/1, P 2/2, M 3/3, total 30.

Measurements.— Table 19.

Comments.— Almost nothing is known about the biology of this subspecies. Massoia (1976) considered it an inhabitant of the eastern tropical forest, and the chacoan and espinal thorn scrub regions. Individuals have been found under the loose bark of trees in Guatemala (Jones, 1966); in bell towers and roofs in French Guiana (Brosset and Dubost, 1967); and flying over pastures and savannas near gullies in Venezuela (Handley, 1976). They range up to 1250 m in Peru (Koopman, 1978). The only data on reproduction for the southern subspecies were given by Myers and Wetzel (1983) for specimens from Paraguay; a pregnant female was captured in November and a reproductively inactive individual was collected in July.

Specimens Examined (5).— CHACO: Resistencia, 1 (MLP). MISIONES: Campo Viera, 1 (ROM); Colonia Mártires, 1 (CEM); Eldorado, 1 (CEM). SANTA FE: Esperanza, 1 (MACN).

Figure 136. Skull and teeth of *Eumops auripendulus*. Adult female from Esperanza, Santa Fe Province (MACN 16547). Bar = 1 cm. Teeth not to scale.

Additional Records.— MISIONES: Bonpland (Eger, 1977); Escuela 633, km 11 (Massoia and Chebez, 1989).

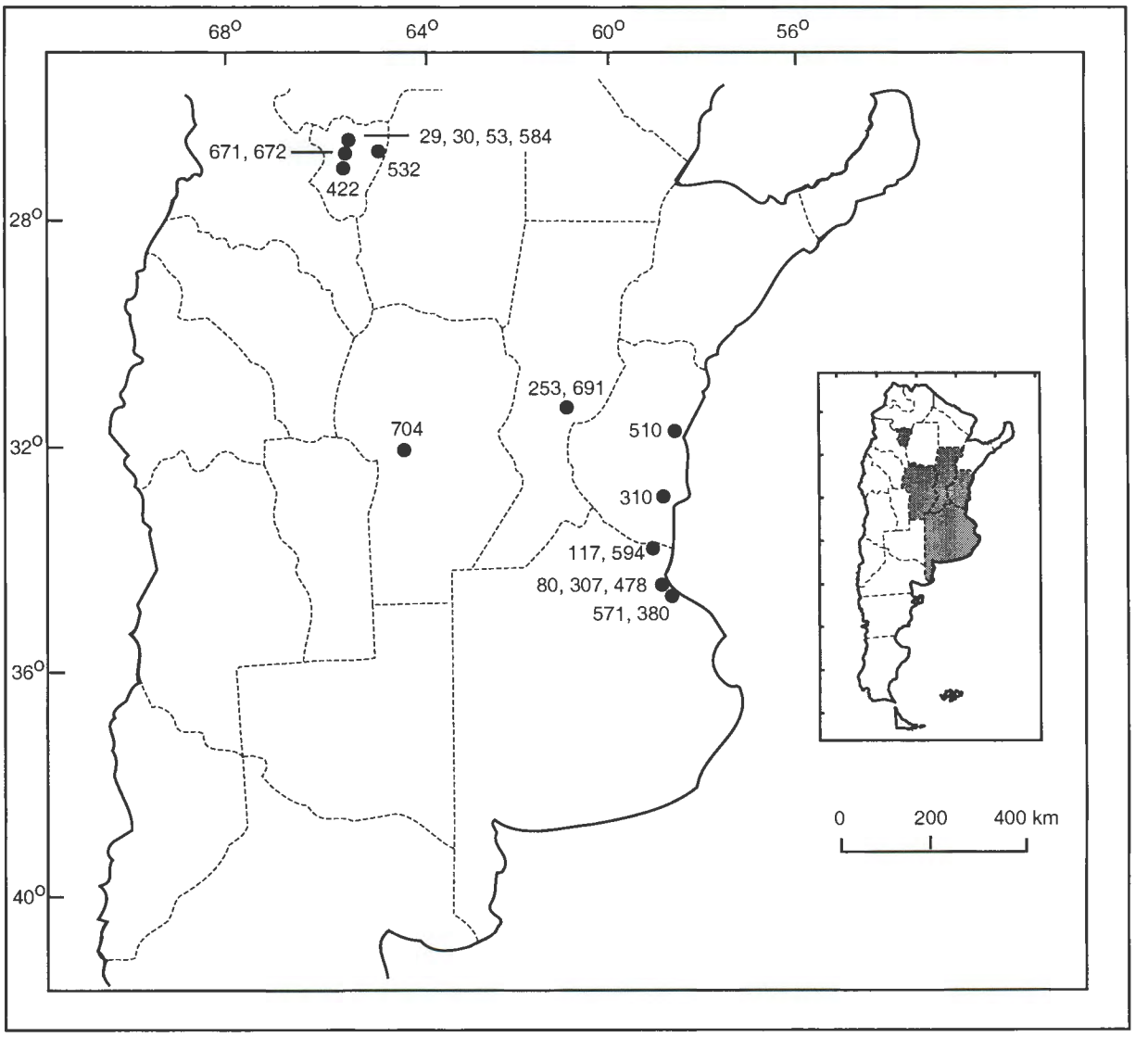


Figure 137. Map of the localities of *Eumops bonariensis*.

Eumops bonariensis (Peters)

Promops bonariensis Peters, Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1874:232, 1874.

Eumops bonariensis bonariensis Sanborn, Journal of Mammalogy, 13:354, 1932.

Four subspecies were recognized by Eger (1977): *E. b. bonariensis*, *E. b. beckeri*, *E. b. nanus*, and *E. b. delticus*. However, we have found *E. b. bonariensis* and *E. b. beckeri* maintaining distinct differences in sympatry in Tucumán Province. Therefore, we have elevated *beckeri* to the species level and have revalidated the name *patagonicus* Thomas, 1924 (see discussion in the *E. patagonicus* account). Other authors have questioned the subspecific status of some of the forms. Handley (1976) considered *nanus* as a distinct species, but Koopman (1993) included this form in *bonariensis*.

Type Locality.— Argentina, Buenos Aires.

Distribution.— The distribution of *E. bonariensis* in South America is wide. *E. b. nanus* is found in the northern part of the continent in a strip from the northern coast of Peru, western Ecuador, northern Colombia, Venezuela, and the Guianas, northward into Cen-

tral America to southern Mexico. *E. b. delticus* is known from only a few localities from the Amazon drainage in Brazil, Peru, and Colombia. The distributions of the other two subspecies are not clear. Apparently those that were previously considered *E. b. beckeri* (here treated as *E. patagonicus*) are found in Bolivia, Paraguay, and Argentina, including the provinces of Buenos Aires and Chubut (the location of the type specimen of *E. patagonicus*). *E. b. bonariensis*, which was previously restricted to Buenos Aires, Uruguay, and southern Brazil, appears to be widely distributed, reaching northwestern Argentina at least as far as the province of Tucumán. Additional specimens from different localities are required to resolve the distributions of the subspecies and the identity of each of the forms.

Distribution in Argentina.— Figure 137.

Description (Figs. 138a, 138b, 138c, 138d, and 139).— Four *Eumops* were collected at Las Talas, Tucumán Province that showed great variation. Using Eger (1977), the three larger specimens were identified as *E. b. bonariensis* and the smaller as *E. b. beckeri*. Later, clear differences also were found for specimens from the Northwest in the MACN collection. The differences between *E. b. bonariensis* and the smaller specimens (*E. b. beckeri* = *E. patagonicus*) are as follows, with the characteristics of *E. patagonicus* given in parentheses (see also Fig. 138): size larger (smaller); ears very wide (narrower); internal keel of the ear thick and long, projecting behind the posterior border of the antitragus (thin and not projecting beyond the anterior border of the antitragus); weight greater (lesser); length of forearm generally more than 48.0 mm (generally less than 45.0 mm); skull elongate (short and globose); basisphenoidal pits, in general, well separated by a wide shelf (in general separated by a thin wall). *E. patagonicus* is discussed below.

Eumops bonariensis is a medium-sized bat, but is small for the Genus *Eumops*. The length of forearm ranges from 46.0 to 49.0 mm, but is normally greater than 48.0 mm. The skull is longer than 18.7 mm and the condylobasal length is more than 17.5 mm. The dorsal color is cinnamon brown, with the bases of the hairs paler, generally white. It is paler ventrally, with the tips of some hairs frosted. The membranes may be light or dark, but are brownish. Ventrally, the hair extends to the sides of the body and plagiopatagium between the midpoint of the humerus almost to the knee; the proximal portion of the uropatagium is also haired.

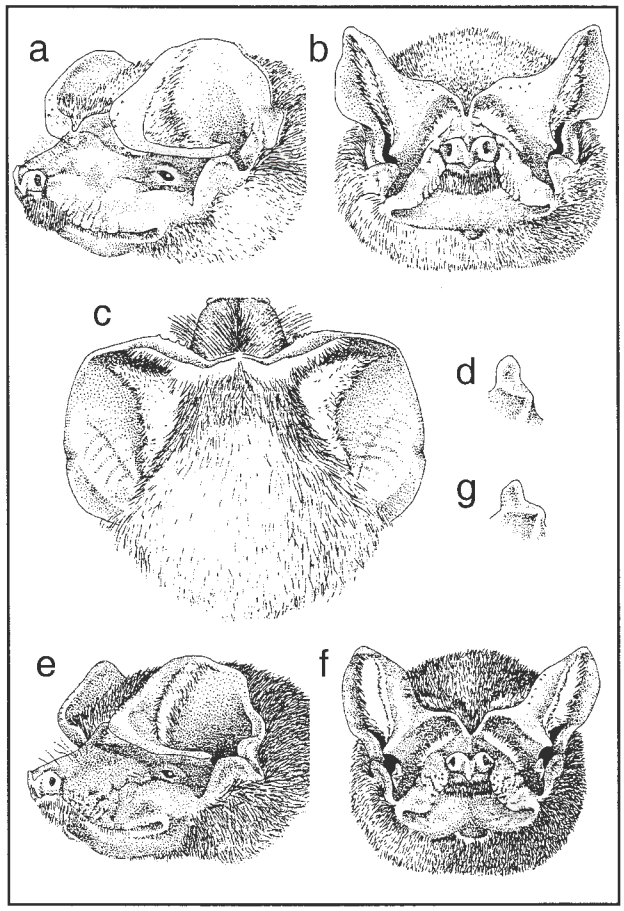


Figure 138. *Eumops bonariensis* (a, b, c, and d) and *Eumops patagonicus* (e, f, and g): (a) face, lateral view; (b) face, frontal view; (c) head, dorsal view; (d) tragus; (e) face; (f) face frontal view; and (g) tragus.

Dorsally, hair is distributed as on the ventrum, but extends over the propatagium to the sides of the forearm, over the plagiopatagium and to the metacarpal of the fifth digit.

The ears are wide but do not extend beyond the tip of the snout when laid forward; they are united by a thin membrane and form a closed "V" (more pronounced than in *patagonicus*). The inner surface of the ear is furrowed with a thick fleshy keel that projects beyond the posterior margin of the antitragus; this keel is traversed by many long, silky hairs. The anterior margin of the ear has small spinous dermal tubercles (generally no more than four). The antitragus is semicircular, and is wider than it is tall. The tragus is small (no more than 2.5 mm high), rounded at the tip, has a slight expansion on its external side, and is hidden by the antitragus.

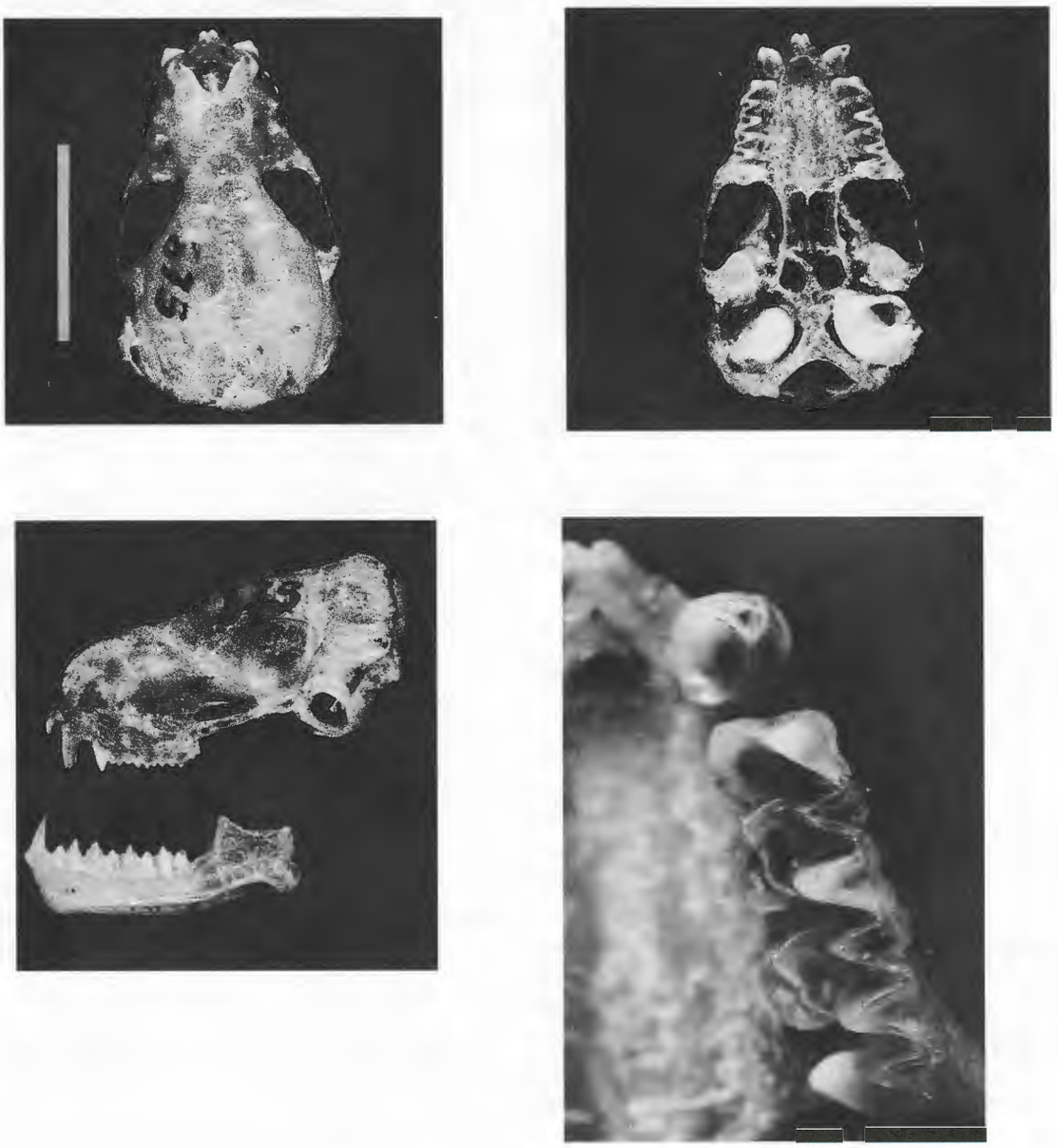


Figure 139. Skull and teeth of *Eumops bonariensis*. Adult female from Las Talas, Tucumán Province (OMNH 18846). Bar = 1 cm. Teeth not to scale.

The snout is broad. The nares, which open to the side, are separated by a "V"-shaped furrow. The upper borders of the nasal openings are furrowed by small cornified processes similar to those of *Tadarida*, but less pronounced. The dorsum of the snout is covered by long hairs (denser than in *patagonicus*) that extend to the union of the ears. The upper lip is thick and wrinkled, but not forming folds as in *Tadarida* or *Nyctinomops*; its lateral margins are bordered by fine hairs, and it has a downward-projecting tuft or moustache. The wing membranes attach at the base of the foot along the internal side of the tibia. More than one-half of the tail is included in the uropatagium. The calcar is long and reaches almost to the tail.

The skull is elongated. The rostrum is narrow, but widens at the lacrimal processes. The braincase has a clear depression near the mastoidal processes. Sagittal

Table 19. Measurements of Eumops auripendulus, Eumops bonariensis, *and* Eumops dabenei. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Eumops auripendulus*	*Eumops bonariensis*	*Eumops dabbenei*
Total length	138.6 ± 8.38, 5 125.0 - 148.0	113.5 ± 8.69, 16 97.0 - 129.0	165.0 ± 0.00, 2 165.0 - 165.0
Tail length	50.8 ± 4.54, 5 47.0 - 58.0	37.1 ± 3.58, 16 31.0 - 43.0	57.5 ± 2.12, 2 56.0 - 59.0
Hindfoot length	10.8 ± 2.04, 5 9.0 - 13.0	8.7 ± 1.40, 14 5.0 - 10.3	
Ear length	19.8 ± 4.08, 5 13.0 - 23.0	21.3 ± 2.17, 16 16.0 - 24.0	26.0 ± 1.41, 2 25.0 - 27.0
Forearm length	65.0 ± 3.08, 5 61.0 - 69.0	47.8 ± 0.92, 20 46.0 - 49.1	78.5 ± 0.71, 2 78.0 - 79.0
Weight		17.5 ± 1.25, 12 16.0 - 20.0	76.0, 1
Condylobasal length	26.1 ± 5.10, 4 23.5 - 33.8	18.2 ± 0.31, 19 17.5 - 18.8	28.4, 1
Least interorbital breadth	8.2 ± 0.05, 3 8.2 - 8.3	6.2 ± 0.15, 19 6.0 - 6.5	10.8, 1
Zygomatic breadth	15.5 ± 0.50, 5 14.9 - 16.2	11.7 ± 0.29, 20 11.1 - 12.3	19.4 ± 0.50, 2 19.0 - 19.7
Greatest length of skull	25.3 ± 0.45, 5 24.6 - 25.7	19.1 ± 0.25, 20 18.7 - 19.7	31.0 ± 0.85, 2 30.4 - 31.6
Postorbital constriction	5.1 ± 0.15, 5 5.0 - 5.3	4.2 ± 0.15, 20 4.0 - 4.5	6.2 ± 0.42, 2 5.9 - 6.5
Breadth of braincase	12.0 ± 0.15, 3 11.9 - 12.2	9.4 ± 0.23, 20 8.8 - 10.0	14.2, 1
Length of maxillary toothrow	9.9 ± 0.28, 3 9.6 - 10.1	7.4 ± 0.11, 20 7.3 - 7.7	12.5, 1
Palatal length	9.9 ± 0.41, 3 9.5 - 10.3	7.3 ± 0.25, 18 7.0 - 7.8	12.4, 1
Mastoidal breadth	13.4 ± 0.45, 3 13.0 - 13.9	11.0 ± 0.27, 19 10.7 - 11.6	16.0, 1
Length of mandibular toothrow	10.9 ± 0.35, 3 10.6 - 11.3	7.9 ± 0.21, 19 7.7 - 8.4	14.3 ± 1.20, 2 13.4 - 15.1
Length of mandible	19.3 ± 0.84, 5 18.2 - 20.3	13.7 ± 0.20, 20 13.4 - 14.2	23.6 ± 1.13, 2 22.8 - 24.4
C-C (width across canines)	6.5 ± 0.37, 3 6.3 - 7.0	4.9 ± 0.15, 19 4.7 - 5.2	8.0, 1
M-M (width across molars)	10.5 ± 0.15, 3 10.4 - 10.7	8.3 ± 0.18, 19 8.1 - 8.7	13.2, 1

and lambdoidal crests are absent or poorly developed. Zygomatic arches are complete and strong, and are thicker anteriorly. The palate is narrow. The toothrows converge anteriorly. The incisive foramen is not divided by a septum and the caudal spine is barely visible. The pterygoids are parallel and wider near the hamular processes, which reach to the midpoint of the basisphenoidal pits. The basisphenoidal pits are oval and deep, and separated by a wide wall. This character may vary with age, but was clearly evident in all specimens examined.

The dental formula is I 1/2, C 1/1, P 2/2, M 3/3, total 30. The upper incisors are hooklike, procumbent, generally parallel, united at the tips, and separated at the base. A diastema is present between the incisors and the canine. The upper canines are well developed, wide in frontal view, and have a posteriorly projecting cingulum that is not in contact with the P2. The P1 is small, cylindrical, and usually displaced to the labial side of the toothrow, although in some specimens it is aligned in the toothrow. The original description is based

on a specimen in which the P1 is not displaced. In most specimens of *E. bonariensis,* however, the P1 is displaced to the labial side of the toothrow. The P2 is wide and well developed; its paracone is the highest cusp of the molariform toothrow; the protocone is low; the hypocone is absent; the mesostyle is in contact with the parastyle of M1. M1 and M2 are basically identical, possess all of the cusps, and have low hypocones. M3 has only three commissures and lacks the hypocone. The i1 and i2 completely fill the space between the canines (in some specimens i1 is displaced forward). The i1 is markedly bilobed, and i2 is less so. The canines are normal, with their base projecting posteriorly below the anterior part of p1. The p1 and p2 are small and kidney-shaped in dorsal view; p1 is smaller than p2. All molars have a well-differentiated talonid and trigonid; m1 and m2 are subequal in size, and m3 is somewhat smaller.

Measurements.— Table 19.

Comments.— The biology of this species is almost unknown. We have found it in the transitional forest of Tucumán Province, as well as in urban areas, where they roost in holes in bridges, below roofs of dwellings, and in holes of eucalyptus and banana trees. Specimens from Aguas Chiquitas, Sierras de Medina, Tucumán, were captured with nets placed over quiet pools of water in gullies in the forest. Cabrera (1958) noted the abundance of this species in trees in the city of La Plata, Buenos Aires Province. Those from Aguas Chiquitas were not reproductively active in October, but two females at the end of December were lactating. Specimens from Las Talas, 4 km N Bella Vista, Tucumán Province, showed no reproductive activity at the end of March or April. These were netted together with *E. patagonicus* (which was reproductively active), *Tadarida brasiliensis*, *Eptesicus furinalis*, *Myotis levis dinelli*, and *Myotis albescens*. Before beginning the evening activity, this species emits loud shrieking calls from the roost. They fly after dark. They are also preyed upon by barn owls (*Tyto alba*) in Misiones (Massoia et al., 1989*c*) and Buenos Aires provinces (Massoia et al., 1989), and of striped owls (*Asio clamator*) in Buenos Aires Province (Massoia, 1988). These bats were common food items of barn owls in Corrientes Province (Massoia et al., 1988).

Specimens Examined (41).— BUENOS AIRES: Bella Vista, 1 (MACN); Delta del Paraná, 1 (MACN); La Plata, 9 (1 BMNH, 8 MLP); Moreno, 1 (MACN). ENTRE RÍOS: Gualeguaychú, 1 (TCWC); Parque Nacional El Palmar, 1 (MACN). SANTA FE: Esperanza, 1 (MACN); Santa Fe, 1 (MFA). TUCUMÁN: Aguas Chiquitas, El Cadillal, 3 (CML); Aguas Chiquitas, Sierras de Medina, 800 m, 4 (CM); Arroyo Aguas Chiquitas, Reserva Provincial Aguas Chiquitas, 5 (CML); Las Talas, 4 km al N de Bella Vista, 3 (OMNH); Piedrabuena, 3 (MACN); Reserva Provincial "Aguas Chiquitas" El Cadillal, 3 (CM); San Miguel de Tucumán, 28 km NE, 3 (CM); San Miguel de Tucumán, 29 km NE, 1 (CM).

Additional Records.— BUENOS AIRES: Canal 6, Delta bonaerense (Massoia et al., 1989); Granja 17 de Abril (Massoia, 1988*b*); Punta Lara (Fornes and Massoia, 1967); Río Carabelas (Fornes and Massoia, 1968). CÓRDOBA: Segunda Usina (Tiranti and Torres, 1998).

Eumops dabbenei Thomas

Eumops dabbenei Thomas, Annals and Magazine of Natural History, ser. 8, 13:481, 1914.

Type Locality.— Argentina, Chaco, Tartagal. Previously the type locality was listed only as "Chaco province" and its exact locality was unknown. The species was described based on specimens that were sent to the BMNH from the MACN. The tags indicated only the province of origin. The type specimen has a tag with the number 8330 that, according to Dr. M. Piantanida (personal communication) is the museum number. The locality for that number is Tartagal, Chaco Province. This locality is found at the northwestern extreme of the province on the shore of the Río Teuco. Carter and Dolan (1978:92) mentioned that on the tag of the type specimen was written "caught on board S. S. Obidense". However, the tag did not have this comment written on it (R. M. Barquez, personal observation). In addition, in the original description Thomas mentioned a second specimen that we did not find in the BMNH.

Distribution.— This species seems either to be rare or difficult to capture and its records are few and scattered. It is known only from Venezuela, Colombia, Paraguay, and Argentina. Specimens from Venezuela (we have examined one at the EBD) are very different from those from Paraguay and Argentina and may represent another subspecies or species. However, we are unable to resolve the problem without additional specimens.

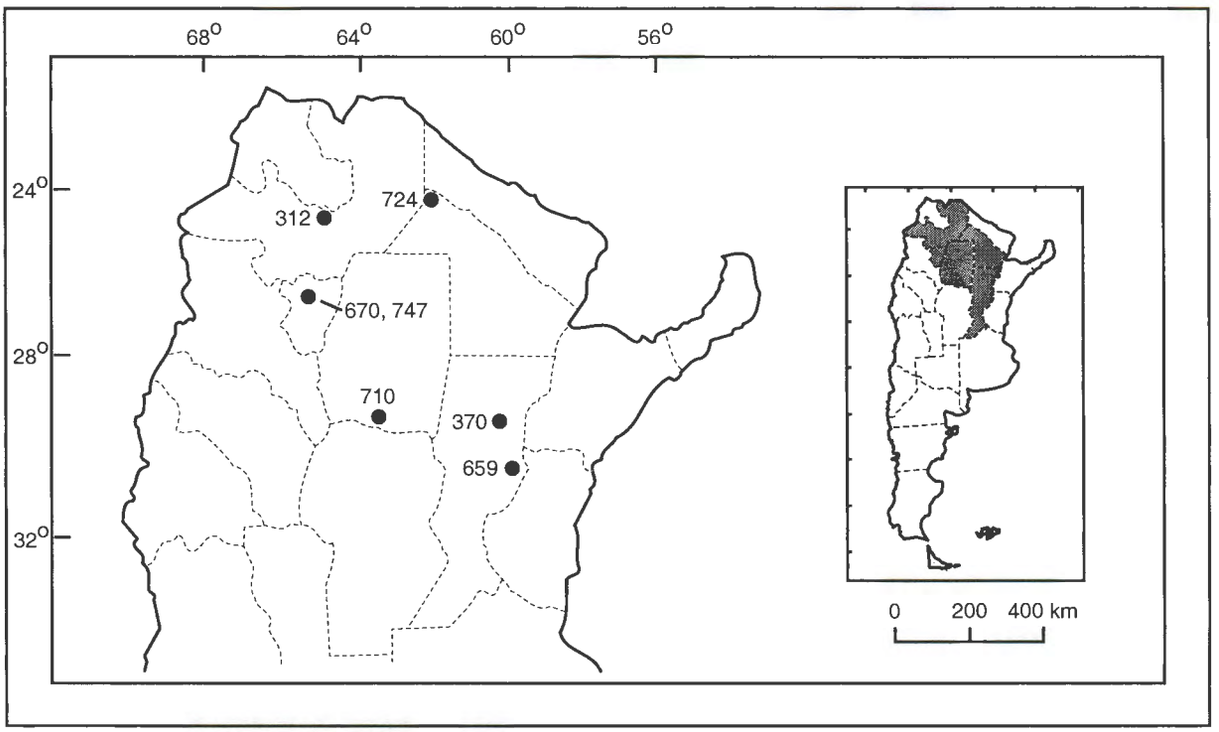


Figure 140. Map of the localities of *Eumops dabbenei.*

Distribution in Argentina (Fig. 140).— This species is known only from the provinces of Chaco, Santa Fe, Salta, and Santiago del Estero. Cabrera (1958) synonymized this species with *E. perotis*. He mentioned having seen in the Instituto de Medicina Regional de la Universidad Nacional de Tucumán specimens of *E. perotis* from Santiago del Estero Province, among which there was one that did not differ in size from the holotype and paratype of dabbenei. This specimen is mentioned by Romaña and Abalos (1950). Thomas's original description of *E. dabbenei* indicated that it was the largest molossid in the Americas, exceeding *E. perotis* in size of the forearm and skull, but this is somewhat exaggerated.

Description (Figs. 141 and 142).— Body size is large; length of forearm is 78, 79, and 82 mm for three of the specimens examined from Argentina. The fourth, the specimen from Tucumán Province, is a young individual with cartilaginous phalanges. Forearms for specimens from Venezuela measure up to 85.7 mm. Dorsal color is ochraceous brown, with the bases of the hairs paler, almost white. Ventral coloration is paler than the dorsum. The ears are notably shorter than in *E. perotis* and do not extend past the tip of the snout when laid forward; they insert about 12 mm posterior to the tip of the snout. The inner keel of the ear and is widened posteriorly, but thinner than in *E. perotis*. The tragus is similar to that of *E. perotis*, square [although Eger (1977) described it as sharply pointed] and well developed. The antitragus is smaller than in *E. perotis*. The rostrum is well differentiated, and covered with hairs, although not as densely as in *E. perotis*. The lips are smooth with a barely visible fringe of hairs and a tuft or moustache on the upper lip. The furrow between the nasal openings forms a closed "V" that differs in form from the open one seen in *E. perotis*. The tail is notably thickened. The thumb is larger than in *E. perotis*, and has a basal triangular pad, which is rounded in *E. perotis*.

The skull is robust, but narrower and shorter than in *E. perotis*. The profile is more elevated over the posterior one-third due to the well-developed sagittal crest. The zygomatic arches are thick and complete, but shorter than in *E. perotis*. The nostrils are not tubular. The basisphenoidal pits are shallow and well separated. The posterior border of palate projects beyond the last molar and the pterygoids are short, less than one-half the length of the palate measured from behind the incisors to the caudal spine.

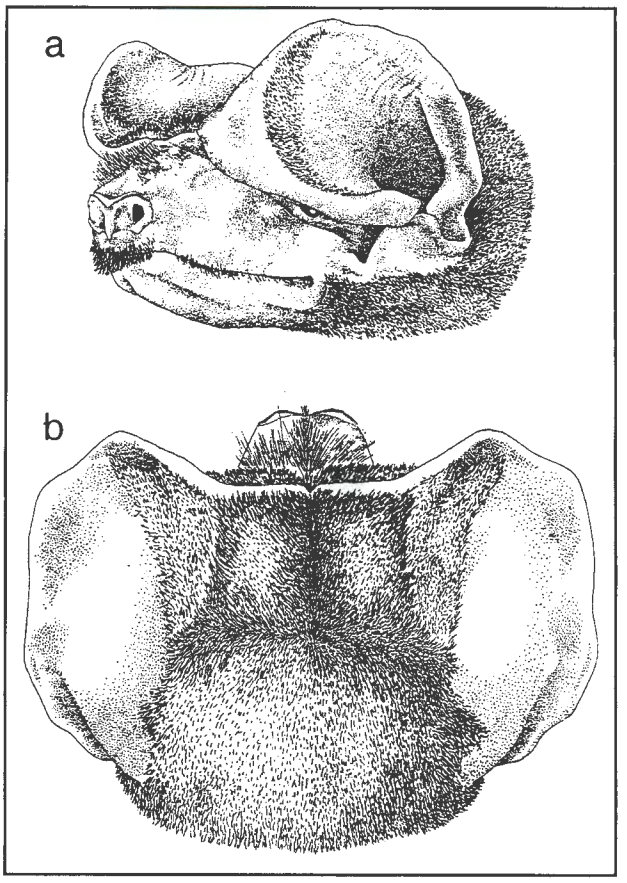


Figure 141. *Eumops dabbenei*: (a) face, lateral view and (b) head, dorsal view.

The dental formula is I 1/2, C 1/1, P 2/2, M 3/3, total 30. The upper incisors are hooklike and procumbent forward (*perotis* is less procumbent). In the specimens examined, the tips of the upper incisors are separated and the bases completely fill the space between the canines. M3 has two well-developed commissures, and a third, which is reduced, is less developed than in *perotis*. The i1 and i2 are as in perotis, but the i2 of a specimen from Paraguay (MACN) is smooth and not bilobed. The dentition of *dabbenei* is, in general, as in *perotis*, but the teeth are wider and more robust in *dabbenei*.

Measurements.— Table 19.

Comments.— The biology of this species is unknown. Myers and Wetzel (1983) captured specimens as they exited a hole about 5 m from the ground in the top of a dead tree located near an artificial lake surrounded by thorn forest, savanna, and palm groves. They also reported capturing a pregnant female in October, and three reproductively inactive females in August. Ibáñez (1979) commented on specimens collected in Venezuela. Barquez and Lougheed (1990) reported a young individual with cartilaginous phalanges captured in mid-December in the roof of a house in the city of Tucumán.

Specimens Examined (4).— CHACO: Tartagal, 1 (BMNH). SANTA FE: La Gallareta, Cerrito, km 60, 1 (MFA); San Javier, 1 (CEM). TUCUMÁN: San Miguel de Tucumán, 1 (CML).

Additional Records.— SALTA: Güemes (Romaña and Abalos, 1950). SANTIAGO DEL ESTERO: Sumampa (Romaña and Abalos, 1950). TUCUMÁN: Tucumán, ciudad (Barquez and Lougheed, 1990).

Eumops glaucinus (Wagner)

Dysopes glaucinus Wagner, Archiv für Naturgeschichte, 9(1):368, 1843.

Eumops glaucinus: Miller, Proceedings of the Biological Society of Washington, 19:85, 1906.

Type Locality: Brazil, Mato Grosso, Cuiabá.

Distribution.— Of the two subspecies recognized by Eger (1977) only one is found in South America, *E. g. glaucinus*. It occurs in the Guianas, Colombia, Venezuela, Ecuador, Peru, Bolivia, northwestern Argentina, Paraguay, and most of Brazil to 25° S. It also occurs in Central America, reaching central México, Cuba, and Jamaica. The other subspecies, *E. g. floridanus*, is restricted to the Florida peninsula.

Distribution in Argentina (Fig. 143).— Fornes (1964) listed *E. abrasus* for Santa Victoria Este, Salta, but the correct identification for these specimens is *E. glaucinus*. Occurrence in the provinces of Catamarca and La Rioja (Olrog and Lucero, 1981) are not documented by specimens.

Description (Figs. 144a, 144b, 144c, and 145).— This species is similar to *E. auripendulus*, both externally and cranially. It differs from *auripendulus* principally by its paler coloration and the almost square tragus. The ears do not extend past the tip of the snout when laid forward and are united by a thin band on the forehead. The ear keel is well developed and projects posteriorly to the middle of the upper border of the an-

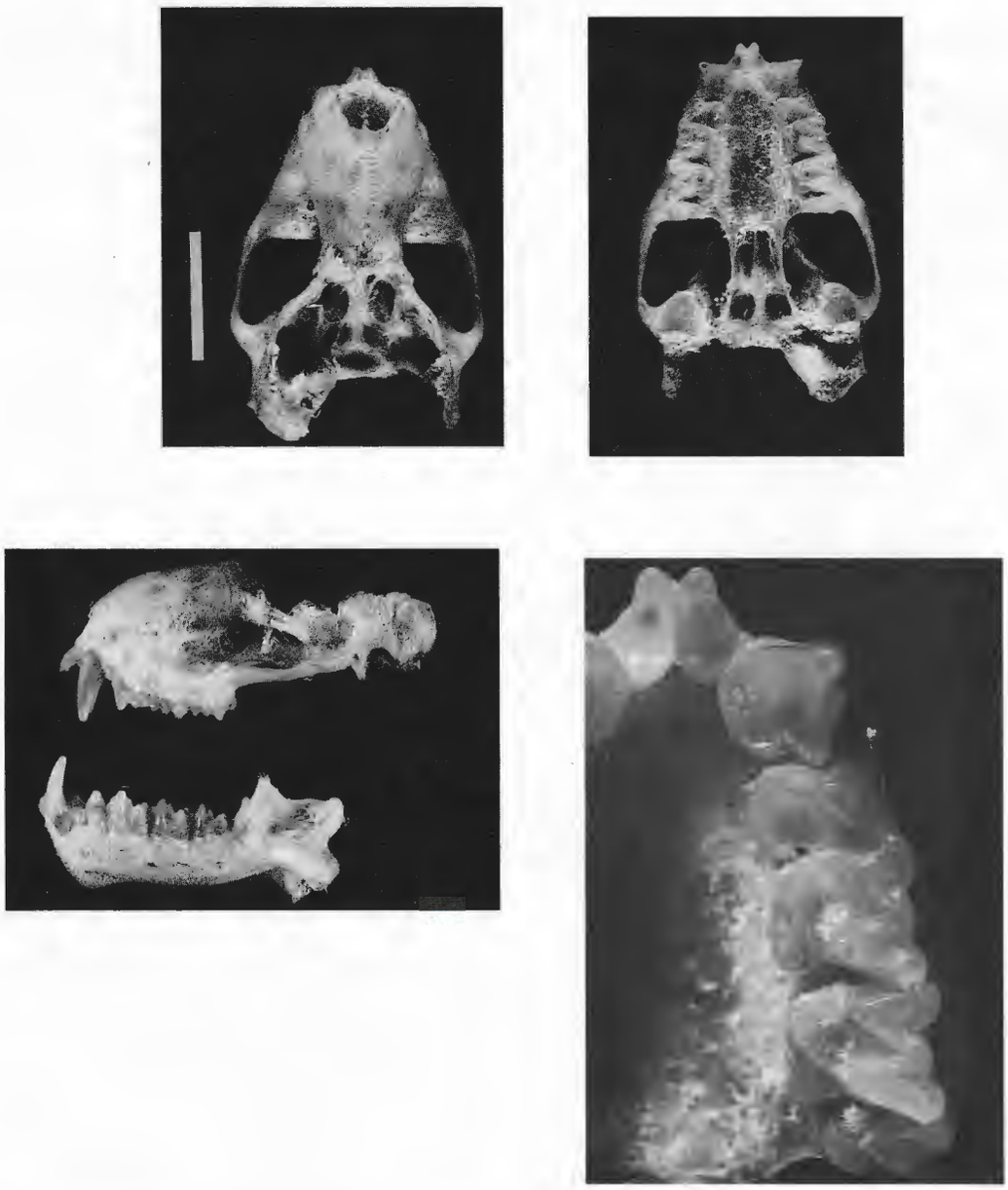


Figure 142. Skull and teeth of *Eumops dabbenei*. Adult female from Yacare, Paraguay (MACN). Bar = 1 cm. Teeth not to scale.

titragus. The tragus is well developed, wider at the base, and narrower at the tip. The lips lack wrinkles; the upper lip has a tuft of short, sparse hairs. Dorsally, hair extends posteriorly along the forearm, along both the anterior and posterior part of the humerus, over the plagiopatagium, along the sides of the body, and over the propatagium. Ventrally, hair extends over the plagiopatagium to the sides of the body and along the posterior margin of the humerus and forearm; the rest of the membranes are naked.

The skull is elongate and the rostrum is narrow. It is quite similar to *E. auripendulus*, but differs in the following traits: the sagittal crest is reduced or absent; the basisphenoidal pits are well defined, deep, and separated; and the third commissure of M3 is rudimentary.

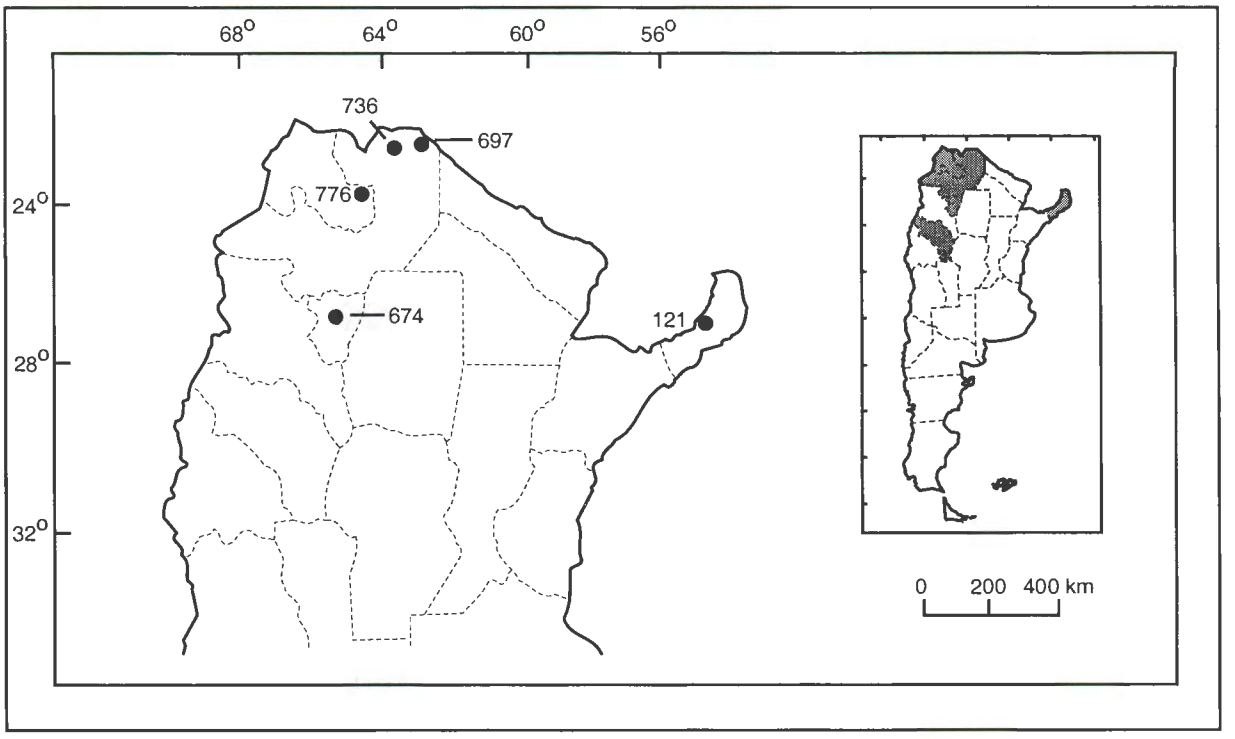


Figure 143. Map of the localities of *Eumops glaucinus*.

Measurements.— Table 20.

Comments.— The biology of this species is poorly known. Eger (1977) found significant geographic variation in this species, but Myers and Wetzel (1983) reported great similarity among specimens from Chaco, Paraguay, and Santa Cruz, Bolivia. Karyotypes of specimens from Mexico, Honduras, and Costa Rica differ from those from Colombia (Warner et al., 1974). The statistical analysis of variation reported by Eger (1977) suggests that this could be a polytypic species composed of isolated populations. Specimens from Argentina are slightly smaller than those from Paraguay and Bolivia.

Its habitats also are poorly known. Specimens have been collected from a hole in the trunk of a tree (Fornes, 1964) and over a shallow river bordered by gallery thorn forest (La Val, 1969). Handley (1976) captured 83% of his specimens while they roosted in trees, 10% with nets, and 7% in dwellings; most of those cap-

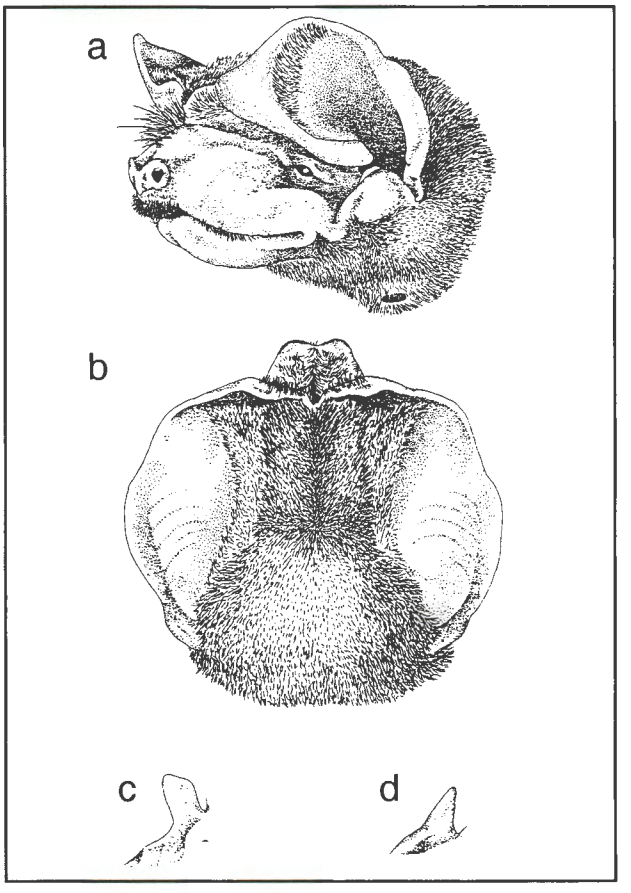


Figure 144. *Eumops glaucinus* (a, b, and c) and *Eumops auripendulus* (d): (a) face, lateral view; (b) head, dorsal view; (c) tragus; (d) tragus.

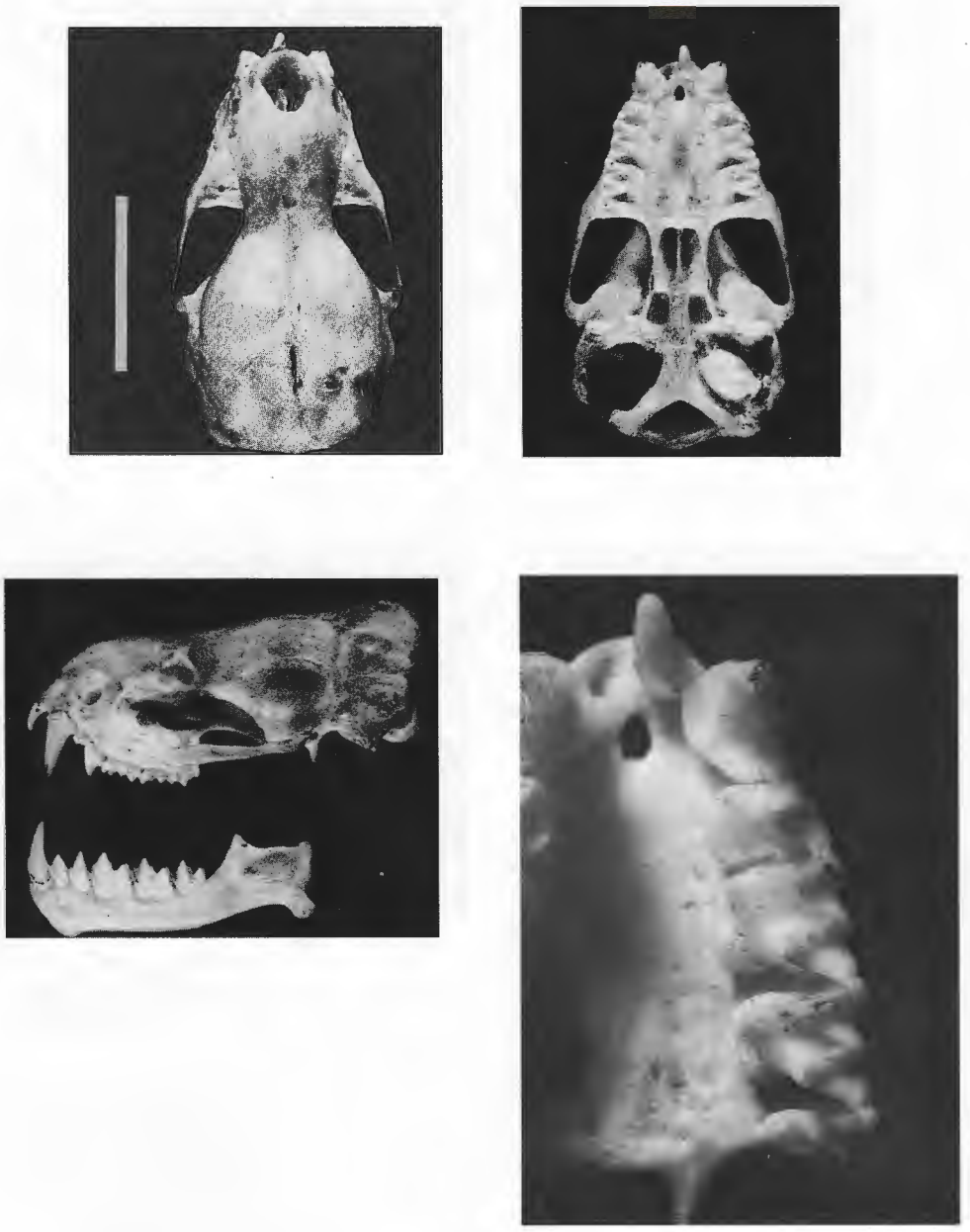


Figure 145. Skull and teeth of *Eumops glaucinus*. Young male from Yuto, Salta Province (CML 492). Bar = 1 cm. Teeth not to scale.

tured with nets were found over gullies, swamps, and ponds. This species is known to be preyed upon by Stygian owls (*Asio stygius)* in the Brazilian cerrado grasslands (Motta Junior and Taddei, 1992).

Little is known about reproduction in this species. A specimen from Yuto, Jujuy (CML), was a juvenile with cartilaginous phalanges and was obtained in mid-September. During the same month in Paraguay, Myers and Wetzel (1983) collected a lactating female; a reproductively inactive one was captured in August. In Venezuela pregnant and lactating females were captured in February, March, and May (Ibáñez Ulargui, 1981)

and in Costa Rica in April, May, August, and December (Gardner et al., 1970).

Specimens Examined (6).— JUJUY: Yuto, 1 (CML). SALTA: Santa Victoria Este, 2 (1 FCM, 1 MACN); Tonono, 1 km E sobre Río Itiyuro, 2 (CML). TUCUMÁN: San Miguel de Tucumán, 456 m, 1 (CML).

Additional Records.— LA RIOJA: Departamento General Roca (Vaccaro, 1992). MISIONES: Caraguatay (Vaccaro, 1992).

Eumops patagonicus Thomas

Eumops patagonicus Thomas, Annals and Magazine of Natural History, ser. 9, 13:234, 1924.

When describing *E. bonariensis beckeri*, Sanborn (1932) noted that *E. patagonicus* seemed to be almost the same size as *E. b. beckeri* from Paraguay and Bolivia. This led him to question whether there was not an error in the locality and, as a consequence, he decided to treat the nominal species of Thomas as a subspecies of *E. bonariensis*, *E. b. patagonicus*. Most authors have since accepted *E. patagonicus* as a synonym of *E. b. bonariensis*. Cabrera (1958) followed this arrangement, noting that *E. patagonicus* cannot be distinguished from typical *bonariensis* and adding that there was no error in the origin (Chubut) of the holotype as Sanborn had suspected, since the specimen was collected by an expedition from the MACN to that province. Additionally, he had seen specimens from Buenos Aires as small as the specimen in question (i.e., *E. patagonicus*). Eger (1977) revised the genus without clarifying the identity of *E. patagonicus* and made only a brief comment about Cabrera's attempt to establish the validity of Chubut as the type locality of *E. patagonicus*; she suggested that additional material from this region would resolve the issue. Monjeau at al. (1994) cite a specimen of *E. patagonicus* that was captured in Dolavon, Chubut Province, the same province as the type specimen.

Because the two forms previously considered to be subspecies of *E. bonariensis*, *E. b. bonariensis* and *E. b. beckeri*, were found in sympatry in Tucumán Province, we initially thought that *beckeri* should be treated as a distinct species. Later, we found that *E. b. beckeri* and *E. b. bonariensis* are also sympatric in the provinces of Sante Fe and Buenos Aires. A specimen in the MACN collection from Mar del Plata exhibited characters of the holotype of *E. patagonicus* in the BMNH, and also was similar to all of the specimens previously treated as *E. b. beckeri*. The description of *E. patagonicus* has priority over *E. b. beckeri* and the name *E. patagonicus* should be used.

Type Locality.— Argentina, Chubut. The holotype (BMNH 23.12.12.18) has a tag with the number of the museum in Buenos Aires (4068), but the exact location is not known (M. Piantanida, personal communication). Consequently, more information cannot be obtained about the precise locality of the origin.

Distribution.— According to Eger (1977) and Barquez et al. (1993) this species occurs throughout Bolivia, Paraguay, and northern Argentina, including Buenos Aires and Chubut provinces.

Distribution in Argentina.— Figure 146.

Description (Figs. 138e, 138f, 138g, and 147).— This species is generally similar to *E. bonariensis* and their differences are listed in the account for *E. bonariensis*. Length of forearm is less than 47 mm in Argentine specimens. Condylobasal length varies from 15.4 to 16.9 mm and greatest length of skull from 16.0 to 18.1 mm. Color is generally gray-brown; many specimens have white hairs scattered over the body, sometimes forming tufts and spots. Bases of the dorsal hairs are white or cream. Ventrally, the general color is paler, with the bases of the hairs dark brown and the tips a strongly contrasting gray or ash. In some specimens, the bases of the ventral hairs are as pale as the bases on the dorsal hairs. The hairs extend over the membranes as in *E. bonariensis* but are more sparse on the sides of the forearm. The keel of the ear is thin and barely reaches the anterior margin of the antitragus, whereas in *E. bonariensis* it surpasses the posterior margin. The tragus is shorter and wider in *E. patagonicus* than in *E. bonariensis*. The ears form a wider angle at the point of insertion on the forehead. The dorsal side of the snout is covered with a less hair in *E. patagonicus* than in *E. bonariensis*.

When these bats are observed alive, *E. bonariensis* is more robust in appearance than *E. patagonicus* (and, although smaller, is more similar to *Nyctinomops macrotis*). *E. patagonicus* is more likely to be confused with *Tadarida brasiliensis*.

The skull and teeth are similar to *E. bonariensis*, but the braincase is shorter and more rounded in *E.*

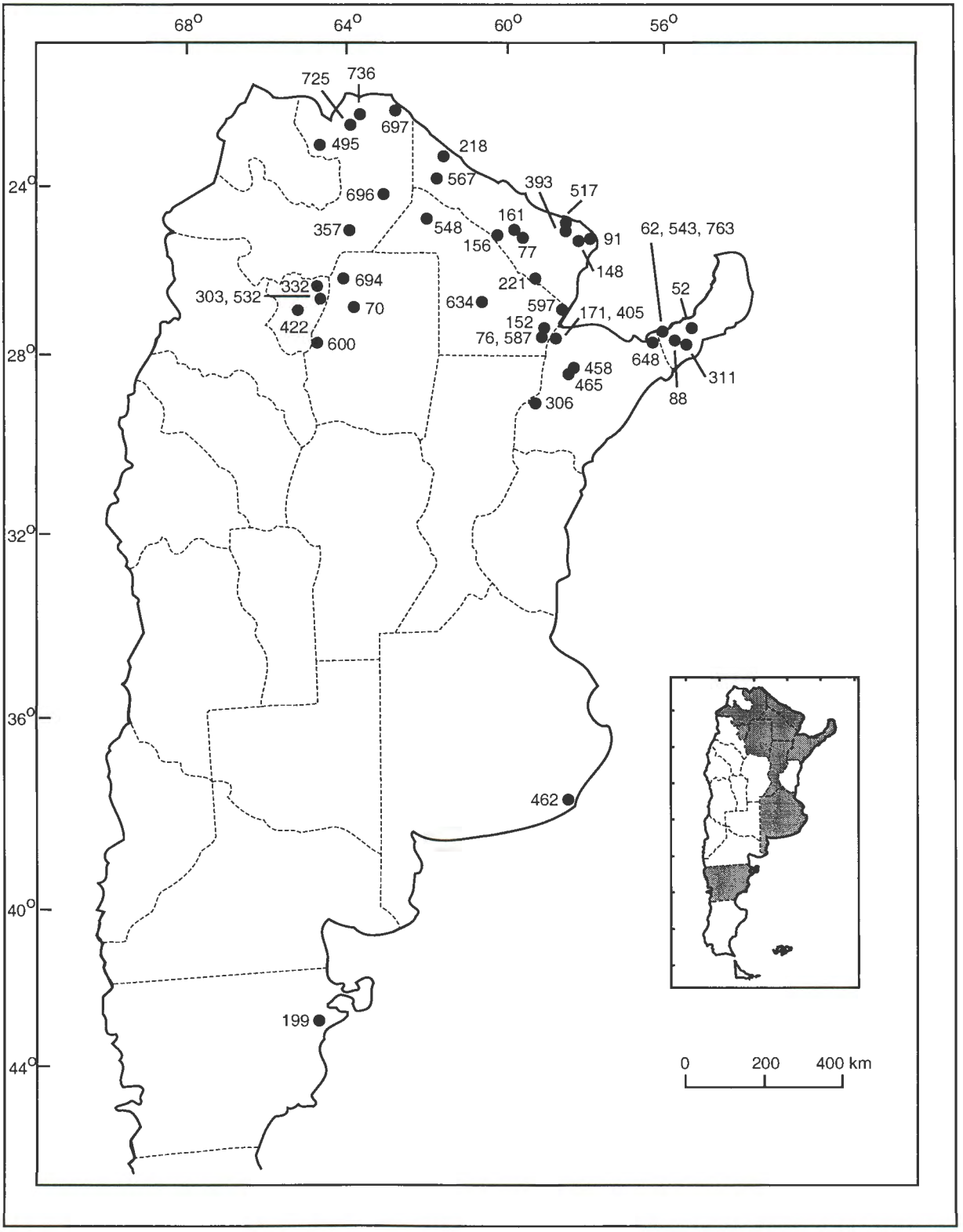


Figure 146. Map of the localities of *Eumops patagonicus*.

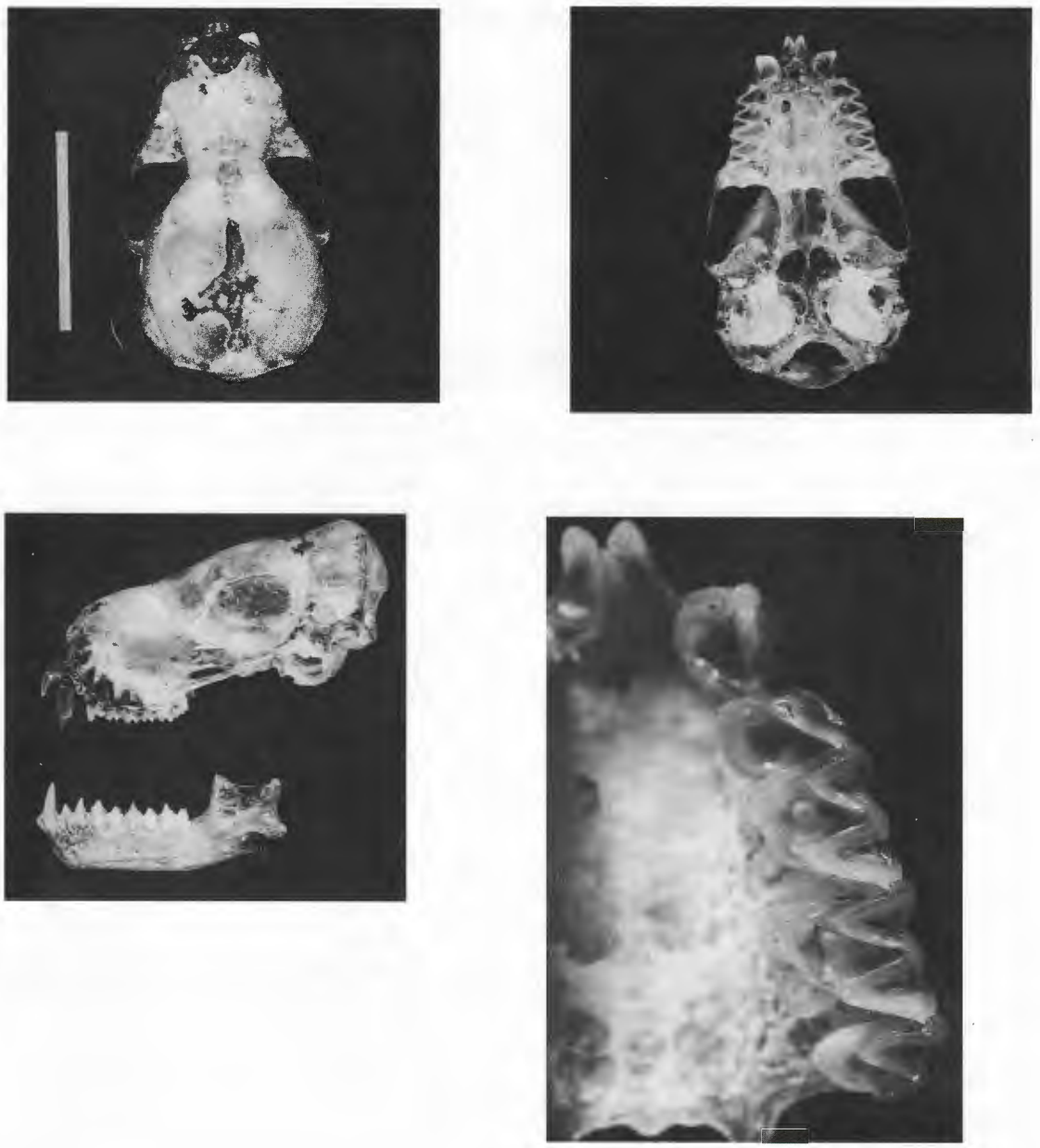


Figure 147. Skull and teeth of *Eumops patagonicus*. Adult male from Las Talas, Tucumán Province (OMNH 18854). Bar = 1 cm. Teeth not to scale.

patagonicus; the cranial depression is less marked; and the basisphenoid pits are deep, oval, and barely separated by a narrow wall.

The tips of the upper incisors are generally in contact. P1 is small and displaced to the labial side of the toothrow.

Measurements.— Table 20.

Comments.— This species seems to be very common in the chaco in disturbed areas, and near human habitations. Individuals were collected in suburban areas of Tucumán Province (see comments in *E. bonariensis*) and over estuaries surrounded by brush, swamps, and palm groves in Formosa Province. Some specimens obtained by J. R. Contreras (personal communication) were roosting below roofs of a rural shed in Laguna Paiva, B° Las Lomas, Corrientes Province.

Table 20. Measurements of Eumops glaucinus, Eumops patagonicus, *and* Eumops perotis. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Eumops glaucinus*	*Eumops patagonicus*	*Eumops perotis*
Total length	142.5 ± 7.59, 4	99.2 ± 5.97, 34	180.8 ± 6.45, 15
	135.0 - 152.0	90.0 - 120.0	163.0 - 192.0
Tail length	55.0 ± 10.80, 4	35.9 ± 2.72, 35	62.3 ± 4.02, 15
	45.0 - 70.0	30.0 - 43.0	56.0 - 71.0
Hindfoot length	11.0 ± 1.82, 4	8.8 ± 1.08, 35	17.5 ± 2.86, 14
	9.0 - 13.0	7.0 - 11.0	11.0 - 21.0
Ear length	24.6 ± 1.15, 3	16.9 ± 2.51, 35	45.9 ± 4.66, 15
	24.0 - 26.0	12.0 - 22.0	35.0 - 52.0
Forearm length	61.0 ± 2.82, 4	44.6 ± 1.21, 36	78.3 ± 2.33, 17
	58.0 - 64.5	42.4 - 47.0	73.0 - 82.0
Weight	26.0 ± 2.82, 2	12.1 ± 2.66, 18	68.1 ± 4.43, 12
	24.0 - 28	0 7.0 - 16.0	60.0 - 76.0
Condylobasal length	22.4 ± 0.30, 3	16.3 ± 0.31, 34	30.5 ± 0.76, 15
	22.1 - 22.7	15.4 - 16.9	29.5 - 32.2
Least interorbital breadth	7.5, 1	5.9 ± 0.25, 32	10.2 ± 0.28, 18
	5.6 - 6.5	9.7 - 10.7	
Zygomatic breadth	14.6 ± 0.69, 3	10.8 ± 0.25, 32	19.0 ± 0.45, 17
	13.8 - 15.0	10.4 - 11.2	17.9 - 19.6
Greatest length of skull	24.0 ± 0.30, 3	17.3 ± 0.37, 33	31.5 ± 0.75, 13
	23.7 - 24.3	16.0 - 18.1	30.4 - 32.7
Postorbital constriction	5.0 ± 0.00	4.1 ± 0.13, 36	5.5 ± 0.18, 18
	5.0 - 5.0	3.9 - 4.5	5.1 - 5.8
Breadth of braincase	11.10 ± 0.55, 3	8.9 ± 0.17, 35	13.9 ± 0.63, 15
	10.5 - 11.6	8.6 - 9.3	12.8 - 15.0
Length of maxillary toothrow	9.8 ± 0.11, 3	6.7 ± 0.14, 36	12.8 ± 0.27, 18
	9.8 - 10.0	6.5 - 7.0	12.2 - 13.3
Palatal length	9.4 ± 0.05, 3	6.5 ± 0.20, 34	12.6 ± 0.33, 16
	9.4 - 9.5	6.1 - 7.0	12.0 - 13.2
Mastoidal breadth	12.9 ± 0.15, 3	10.2 ± 0.26, 30	15.8 ± 0.37, 14
	12.8 - 13.1	9.6 - 10.7	15.2 - 16.5
Length of mandibular toothrow	10.8 ± 0.85, 3	7.3 ± 0.16, 29	13.9 ± 0.37, 17
	10.2 - 11.8	6.9 - 7.7	12.9 -14.4
Length of mandible	17.8 ± 0.26, 3	12.2 ± 0.22, 31	23.8 ± 0.59, 17
	17.5 - 18.0	11.8 - 12.6	22.3 - 24.7
C-C (width across canines)	5.8, 1	4.3 ± 0.16, 36	8.6 ± 0.19, 18
	4.0 - 4.6	8.2 - 8.9	
M-M (width across molars)	9.4, 1	7.8 ± 0.21, 36	13.2 ± 0.26, 18
	7.3 - 8.2	12.8 - 13.8	

This is a common species in the Paraguayan chaco where it has been taken, together with *Myotis albescens*, *M. nigricans*, and *Molossops temminckii*, from under roofs constructed with trunks of overlaid palms (Myers and Wetzel, 1983). Pregnant females were captured in September and October; individuals exhibited no reproductive activity in January and from April to August (Myers and Wetzel, 1983). However, in Las Talas, 4 km N of Bella Vista, Tucumán Province, a male captured in April had scrotal testes, as did others from Clorinda, 13 km al S, sobre ruta 11, Formosa Province, in the same month.

Specimens Examined (171).—BUENOS AIRES: Mar del Plata, Campo de los Padres, 1 (MACN). CHACO: Barranqueras, 27 (5 CML, 1 MACN, 21 TTU); Colonia Benítez, 1 (CML); Pozo del Gato, 2 (CML); Resistencia, 15 (14 BMNH, 1 KU); Río de Oro, General Vedia, 2 (CML). CHUBUT: Chubut (no specific locality), 1 (BMNH). CORRIENTES: Corrientes

Capital, Escuela 599, 12 (CML); Goya, 600 m, 5 (BMNH); Laguna Paiva, B° Las Lomas, 2 (OMNH); Manantiales, 18 (3 CML, 14 MACN, 1 MLP); Mburucuyá, 1 (MACN); San Borgita, 1 (TTU). FORMOSA: Bartolomé de Las Casas, 1 (CML); Clorinda, 13 km al S, sobre ruta 11, 1 (CML); Colonia km 503, 8 (CML); Comandante Fontana, 1 (CML); El Churcal, approx. 10 km SSE Buena Vista, 3 (2 CML, 1 IADIZA-CM); El Colorado, 4 (1 CML, 1 MACN, 2 TTU); Puesto Divisadero, 35 km S, 5 km E Ing. Guillermo N. Juárez, 2 (CML). MISIONES: Aristóbulo del Valle, 10 km W by road along Río Cuñapirú, 2 (1 CML, 1 IADIZA-CM); Misiones (no specific locality), 1 (BMNH); Villa Lanús, 3 (1 MACN, 2 TTU). SALTA: Joaquín V. González, 8 km SE, Finca San Javier, 1 (RMB); Orán, 15 km S, 15 km W, along Río Santa María, 1 (CM); Santa Rosa, 13 (CML); Tartagal, 1 (MACN); Tonono, 1 km E sobre Río Itiyuro, 14 (CML). SANTA FE: Puerto San Martín, 1 (SUVM). SANTIAGO DEL ESTERO: Bañado de Figueroa, Río Salado, 1 (CML); Río Dulce, 5 km E Las Termas, camino a Vinará, 1 (CML). TUCUMÁN: Gobernador Piedrabuena, 19 (MACN); Iglesia, 1 (MACN); Las Talas, 4 km al N de Bella Vista, 1 (OMNH); Piedrabuena, 3 (TTU).

Additional Records.— CHACO: Saenz Peña (Eger, 1977); Villa Guillermina (Romaña and Abalos, 1950). CHUBUT: Dolavon (Monjeau et al., 1994). CORRIENTES, Ensenadita (Massoia et al., 1988). FORMOSA: Bouvier, Clorinda (Eger, 1977); Laguna Blanca (Massoia, 1970); Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.). MISIONES: Arroyo Urugua-í (Massoia et al., 1987); Arroyo Zaimán (Massoia, 1980); Bonpland (Massoia et al., 1989*c*); Guaraní (Massoia, 1980); Posadas (Massoia, 1980). SALTA: Santa Victoria Este (Fornes and Massoia, 1967). SANTIAGO DEL ESTERO: Santa Isabel (Eger, 1977).

Eumops perotis (Schinz)

Molossus perotis Schinz, Naturgeschichte und Abbildungen der Säugethiere. Das Thierreich eingetheilt nach dem Bau der Thiere als Grundlage ihrer Naturgeschichte und der vergleichenden Anatomie von dem Herrn Ritter von Cuvier. Säugethiere und Vögel. J. G. Cotta'schen Buchhandlung, Stuttgart und Tübingen, 1:870, 1821.

Eumops perotis: Miller, Proceedings of the Biological Society of Washington, 19:85, 1906.

Type Locality.— Brazil, Rio de Janeiro, Rio Paraiba, Campos do Goitacazes.

Distribution.— Eger (1977) recognized two subspecies, one of them in North America, *E. p. californicus*, and the other in South America, *E. p. perotis*. A third, *E. p. trumbulli*, has been recognized by some authors, but considered by Smith and Genoways (1969) and Eger (1977) to be a separate species, *E. trumbulli*. Anderson and Webster (1983) recorded both forms (*E. perotis* and *E. trumbulli*) in northern Bolivia, Department of Beni, although not in sympatry.

The distribution of *E. p. perotis* extends as a narrow strip from northern Venezuela and Colombia, along the western slopes of the Andes of Ecuador, Peru, Chile, and Argentina, southward to the province of Córdoba. It occurs in Bolivia, Paraguay, and east-central Brazil. It has not been cited for Uruguay. It does not enter the Amazon drainage, an area that is occupied only by *E. trumbulli*.

Distribution in Argentina.— Figure 148.

Description (Figs. 149 and 150).— *Eumops perotis* is distinguished easily from most other *Eumops* by its large size. It is similar only to *E. dabbenei*, from which it differs by its ears that, when laid forward, project beyond the tip of the snout. Length of forearm ranged from 73.0 to 82.0 mm in the specimens examined. Dorsal color is brownish gray with the bases of the hairs generally white; however, in some specimens the bases of the dorsal hairs can be vary from gray to brown. Ventral color is paler. Dorsally, the pelage extends over the base of the uropatagium, borders the forearm near the plagiopatagium up to the union of the fourth and fifth metacarpals, and over the propatagium. Ventrally, the pelage extends over the plagiopatagium to the sides of the body; it borders the humerus and a small part of the forearm. The dorsal surface of the snout is covered with long, fine hairs, which also are present between the nares, at the union of the ears, and bordering the margin of the internal keel of the conch. The ears are semicircular and united on the anterior dorsal part of the snout. The ear keel is thick, becoming wider posteriorly. The tragus is well developed, square in shape, and about 1.5 mm in height. The antitragus is large, semicircular, and about twice as wide as it is tall. The rostrum is short. The upper lip has a moustache at its tip. The nares open upward and outward and are bor-

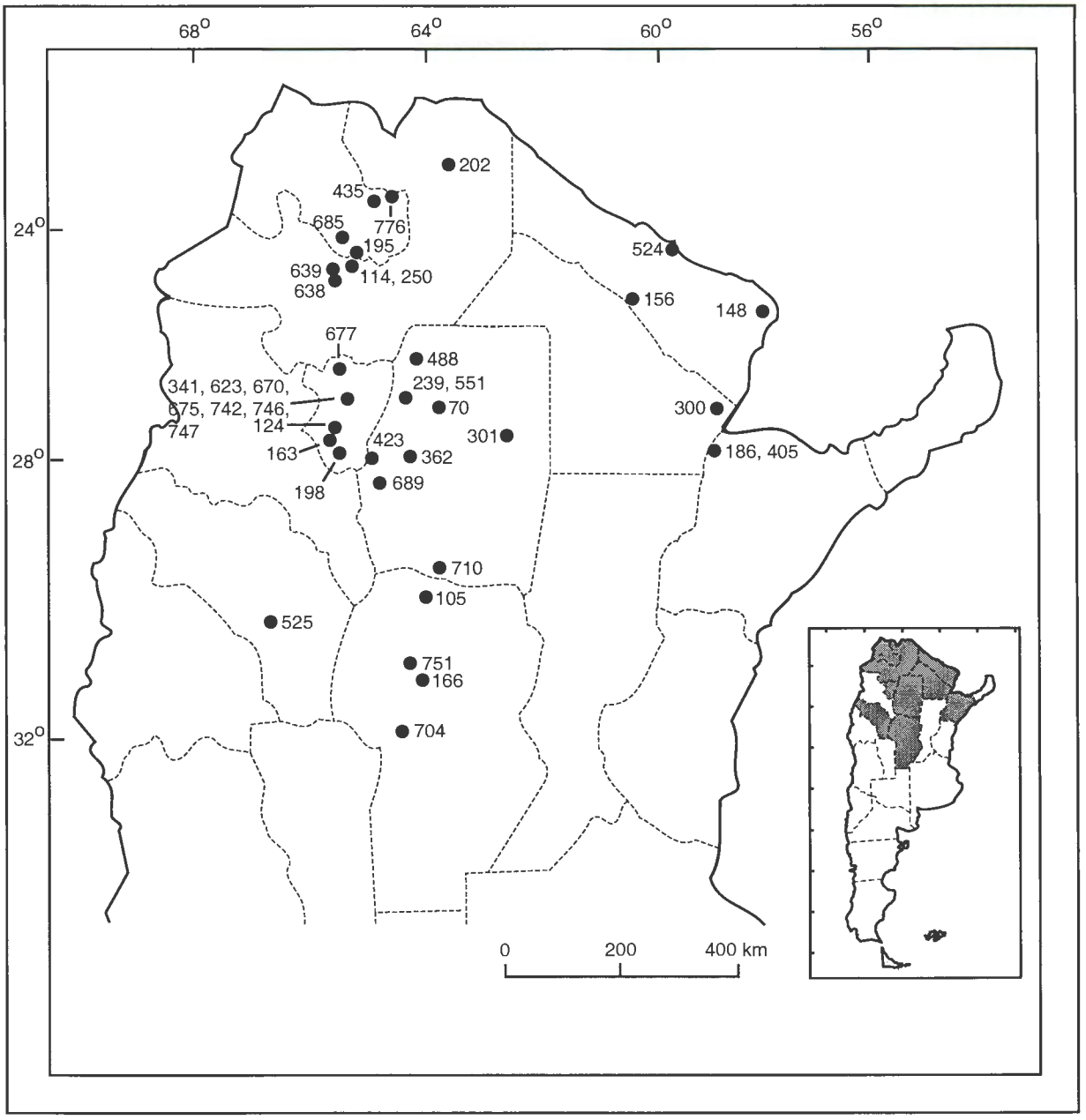


Figure 148. Map of the localities of *Eumops perotis*.

dered by a series of small dermal tubercles. The lips are thick, smooth, and without wrinkles. The wings are long and narrow and attach on the lower one-half of the tibia. The tail is thick, with less than one-half its length included in the uropatagium. The calcars are well developed and about the same length as the portion of the tail enclosed in the uropatagium. A gular sack is generally visible and is more developed in males.

The skull is elongated, narrow, and flattened in silhouette, but widened at the lacrimal processes in dorsal view. The postorbital constriction is pronounced, permitting a clear definition between the rostrum and the braincase. The sagittal crest is present but low, beginning slightly anterior to the postorbital constriction; it is slightly more elevated in males and hardly visible in juveniles. The lambdoidal crests are well developed,

but less so than in *E. dabbenei*, and project posteriorly only slightly; they are hardly visible in juveniles. The zygomatic arches are complete, well ossified, and thinner on the posterior one-third. The palate is narrow, extending beyond the last molars. The pterygoids are long, approximately one-half the length of the palate (less than one-half in *E. dabbenei*). The basisphenoidal pits are deep, oval, and separated by a thin shelf (they are notably larger in *E. perotis* than in *E. dabbenei*). The nostrils are tubular and have a small anterolateral projection that is not present in *E. dabbenei*.

The dental formula is I 1/2, C 1/1, P 2/2, M 3/3, total 30. The upper incisors: are hooklike; project downward (they are proodont in *E. dabbenei*); are united basally; generally fill the space between the canines; and, in many specimens, their tips are in contact (in others they are divergent). The canines are normal. The P1 is small and usually displaced to the labial side of the toothrow. The P2 and the canine are normally in contact. Occasionally P1 is slightly displaced lingually and, in some individuals, is vestigial, a condition that we have observed in only one of the toothrows at a time. P2 has an elevated paracone and a reduced protocone. M1 and M2 are identical, with four commissures, a well-developed protocone, and a reduced (or absent) hypocone. The M3 has three commissures, the third reduced. In *E. dabbenei*, two commissures are normally present, although sometimes the third also is present. The i1 and i2 are bilobed and fill the space between the canines; i1 is displaced forward. The cingulum of the canines projects posteriorly so that it inserts below the anterior margin of p1. The p1 and p2 are similar, but p1 is smaller; both have one well-developed cusp, the protoconid. In the lower molars, the talonid and trigonid are well differentiated; m1 and m2 are subequal in size, and m3 is smaller.

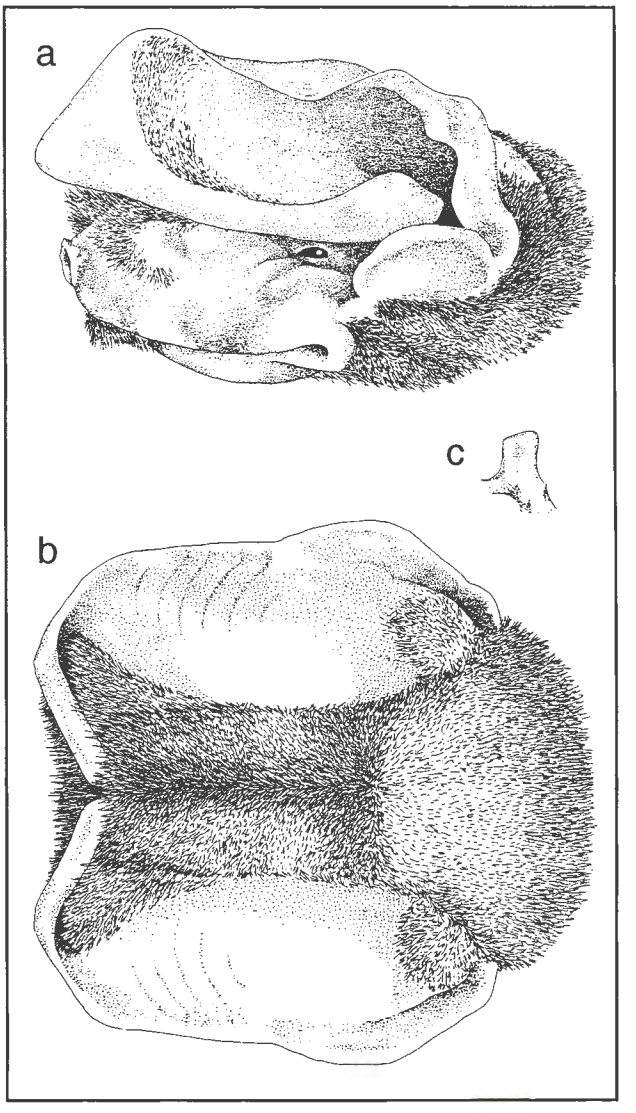


Figure 149. *Eumops perotis*: (a) face, lateral view; (b) head, dorsal view; and (c) tragus.

Measurements.— Table 20.

Comments.— This is a common species in urban areas where it roosts in cracks and roofs of buildings, in towers, and in trees. In natural areas it uses cracks in rocks of cliffs. It may be colonial or solitary. Vaughan (1959) summarized information on roosts, functional morphology, food habits, and flight for the North American subspecies.

Little is known about diet in this species. Freeman (1981*b*) suggested that it fed on soft prey, unlike *auripendulus*. Freeman (1979) indicated that this species prefers lepidopterans of the Family Sphingidae. This species is common in the city of Tucumán, where it roosts mainly in trees. In Laguna Paiva, Corrientes Province, old abandoned rural dwellings are used as daytime roosts. Little is known about reproductive activity of this species in Argentina. A juvenile with deciduous dentition was captured in mid-December in the city of San Miguel de Tucumán; specimens showing no reproductive activity were recorded at the beginning of May, in Clorinda, 13 km S, sobre ruta 11, Formosa Province, and during the mid-March in Corrientes Province. Barquez and Ojeda (1992) reported a large colony liv-

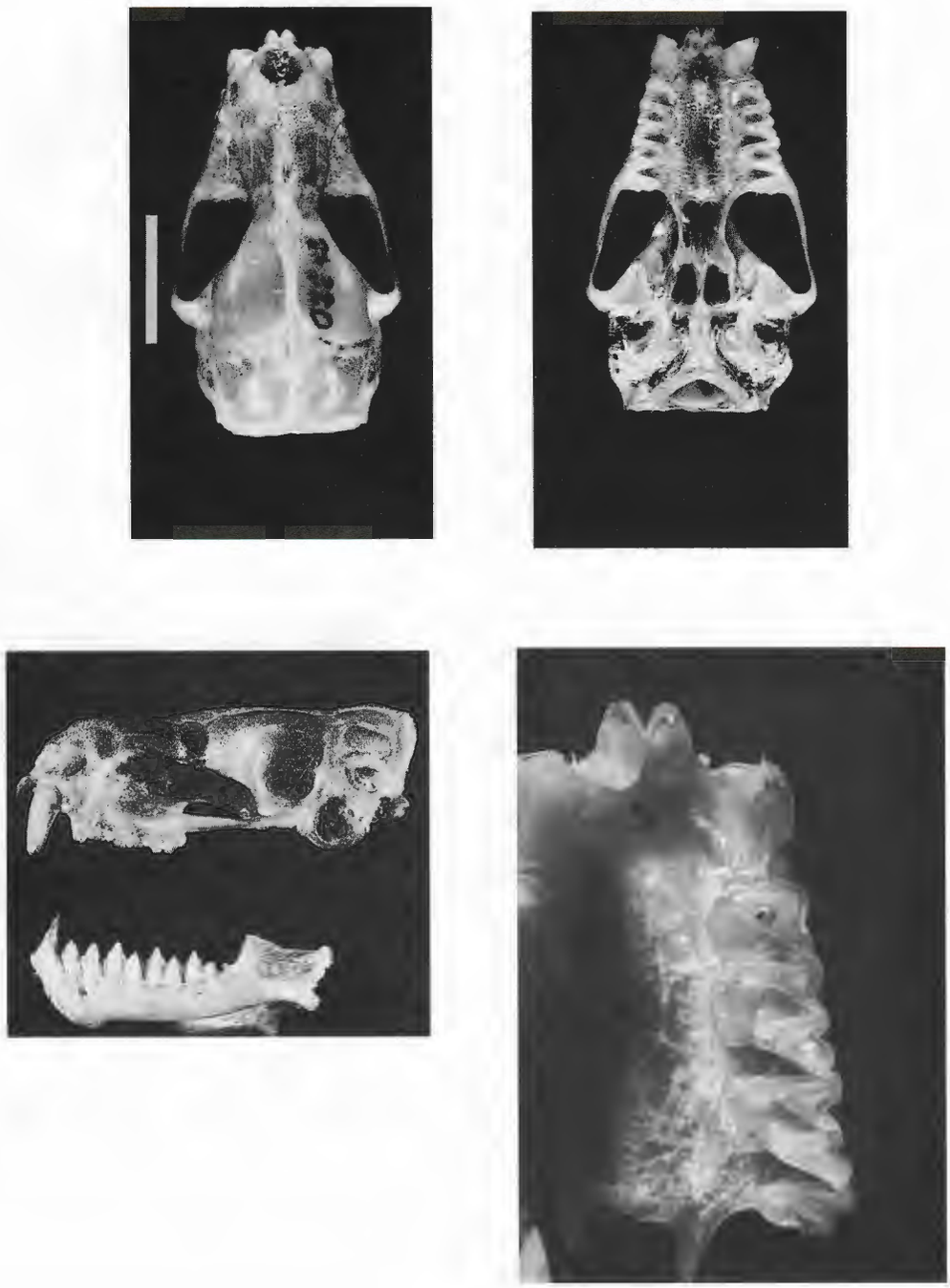


Figure 150. Skull and teeth of *Eumops perotis*. Adult, sex unknown from Tucumán Province, (CML 2242). Bar = 1 cm. Teeth not to scale.

ing under the roof of a rural dwelling in Colonia km 503, Formosa. In Corrientes Province, Massoia et al. (1990) found that this species was eaten by barn owls (*Tyto alba*).-

Specimens Examined (78).— CHACO: General Vedia, 2 (1 ROM, 1 TCWC). CÓRDOBA: Córdoba, 1 (BMNH); Unquillo, 1 (MACN). CORRIENTES: Laguna Paiva, B° Las Lomas, 11 (OMNH). FORMOSA: Clorinda, 13 km al S, sobre ruta 11, 1 (CM); Colonia km 503, 1 (CML); Patiño, 1 (MACN). JUJUY: Yuto, 1 (AMNH). LA RIOJA: Patquía, 1 (MACN). SALTA: Campo Santo, Escuela Nacional 149, 5 (2 ROM, 3 TCWC); Salta Capital, 1 (MACN). SANTIAGO DEL ESTERO: Bañado de Figueroa, Río Salado, 1 (CML); El Retiro, 1 (MACN); Nueva Esperanza, 1 (MACN); Pozo Hondo, 1 (MACN); Santa Catalina, 5 km W, 1 (MACN); Sarapampa, 1 (SIG). TUCUMÁN: Concepción, 28 (7 BMNH, 1 FMNH, 20 MACN); Dique San Ignacio, 1 (CML); Instituto Lillo, San Miguel de Tucumán, 1 (CML); Las Talitas, 1 (CML); Río Salí, 1 (CML); San Miguel de Tucumán, 9 (8 CML, 1 SIG); San Miguel de Tucumán, Plaza Independencia, 1 (CM); San Pedro de Colalao, 1 (CML); Tucumán, 1 (FMNH); Tucumán, 456 m, 2 (BMNH).

Additional Records.— CÓRDOBA: Cama Cortada, cerca de Los Hoyos (Crespo et al., 1961); Segunda Usina (Tiranti and Torres, 1998). CORRIENTES: Desaguadero, Escuela 208, Ruta Provincial 5, a 20 km de Corrientes (Massoia et al., 1990). JUJUY: Dique La Ciénaga, casa del club náutico, 30 km SSW San Salvador de Jujuy, 1000 m (Villa-R. and Villa-C., 1971); Libertador General San Martín (Eger, 1977); San Salvador de Jujuy (Eger, 1977). SALTA: Dragones (Eger, 1977); Escuela 149, 30 km NE Salta (Villa-R. and Villa-C., 1971); Salta, 30 km NE (Eger, 1977). SANTIAGO DEL ESTERO: Girardet (Romaña and Abalos, 1950); La Banda (Romaña and Abalos, 1950); Las Termas (Romaña and Abalos, 1950); Sumampa (Romaña and Abalos, 1950). TUCUMÁN: Caspichango (Massoia, 1976); Tucumán, ciudad (Romaña and Abalos, 1950).

Genus *Promops*

This genus contains two species and both occur in Argentina. They are similar in appearance and differ mainly in size. They may be confused with some species of *Molossus*. In *Promops*, the upper incisors are long and proodont and there are two pairs of lower incisors. In *Molossus*, the upper incisors are 1/1, short and projected downward, and there is only one pair of lower incisors. The deeply concave palate of *Promops* differs from the comparatively flat palate of the other molossids. The snout has a strongly domed median keel in *Promops*; in *Molossus* the keel is well developed, but straight. Cranially, *Promops* are quite distinct from the other molossid genera. The ears are short and do not extend beyond the tip of the snout when they are laid forward. The ears are separated, although only slightly. The tragus is small and the antitragus is more developed. The wings are long and narrow. The tail is comparatively long in relation to other Argentine molossids. The calcars are long, reaching the tail.

This genus needs additional taxonomic work. Thomas (1915) recognized six species (*centralis*, *occultus*, *fosteri*, *nasutus*, *ancilla*, and *pamana*) and later added a seventh, *P. davisoni* (Thomas, 1921). Only two species are presently recognized, *P. centralis* and *P. nasutus*.

The biology and ecology of these species is poorly known and the taxonomy and status of the different populations is uncertain.

Promops centralis Thomas

Promops centralis Thomas, Annals and Magazine of Natural History, ser. 8, 16:62, 1915.

Promops occultus was described by Thomas (1915) from Paraguay and presently is treated by many authors as a subspecies of *P. centralis*. Handley (1966) considered *P. occultus* conspecific with *P. centralis* and *P. davisoni* from Peru. Ojasti and Linares (1971) indicated that *occultus* and *davisoni* should be treated as subspecies of *centralis*, an opinion shared by Koopman (1978) and Freeman (1981*a*). Genoways and Williams (1979) did not agree that *davisoni* should be treated as a subspecies of *centralis* due to its smaller size, which they felt placed it near *P. nasutus*. We recognize the specimens from Argentina as *P. c. occultus*.

Distribution.— This species occurs from Mexico to Peru, and northern Argentina. It is also found in Suriname, and has been collected in Bolivia (Ibáñez and Ochoa, 1985).

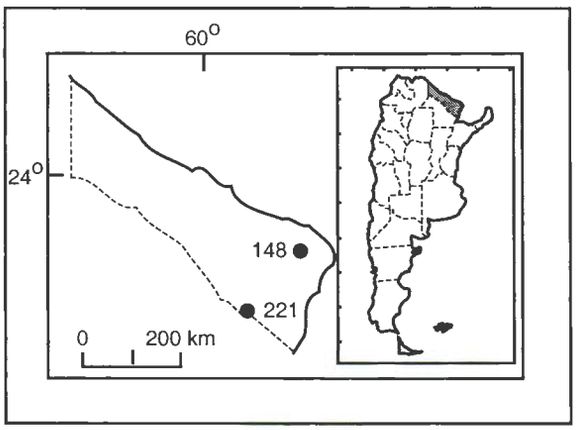


Figure 151. Map of the localities of *Promops centralis*.

Promops centralis occultus Thomas

Promops occultus Thomas, Annals and Magazine of Natural History, ser. 8, 16:62, 1915.

Type Locality.— Paraguay, Supucay.

Distribution in Argentina.— Figure 151.

Description (Figs. 152 and 154f).— General appearance is similar to *P. nasutus*, but *P. centralis occultus* is slightly larger, with the length of the forearm greater than 50 mm. Dorsal color is dark brown, with the basal two-thirds of the hairs pale, not white as in some specimens of *P. nasutus*.

The dental formula is as in *P. nasutus*, but the skull is more robust and large, and the sagittal crest is well developed, especially in males. Other characters are as in *P. nasutus* (see the species account for *P. nasutus*).

Measurements.— Table 21.

Comments.— The biology of this species is almost unknown. Myers and Wetzel (1983) captured a pregnant female in September in the chaco of Paraguay. A specimen from Clorinda, 13 km S, sobre ruta 11, Formosa Province, was reproductively active at the beginning of May (winter). This specimen was captured in a net placed over a puddle of rainwater in an area of cleared fields and cultivated plants. Massoia (1976) captured six specimens from a daytime roost located in a palm tree at El Colorado, Formosa Province.

Specimens Examined (4).— FORMOSA: Clorinda, 13 km al S, sobre ruta 11, 1 (CML); El Colorado, 3 (MACN).

Promops nasutus (Spix)

Molossus nasutus Spix, Simiarum et Vespertilionum Brasiliensium species novae ou histoire naturelle des especies nouvelles de singes et de chauve-souris observées et recueillies pendant le voyage dans l'intérieur du Bresil execute par ordre de S. M. le Roi de Baviere dans les annees 1817, 1818, 1819, 1820. Francisci Seraphici Hübschmanni, Monachii, p. 58, 1823.

Promops nasutus: Miller, Bulletin of the United States National Museum, 57:260, 1907.

Type Locality.— Brazil, Bahia, Rio São Francisco.

Distribution.— This species is found in Suriname, French Guiana, eastern Venezuela, eastern Ecuador, eastern Peru, and western and central Brazil and southern Bolivia to Paraguay and northern Argentina (Anderson, 1991, 1997; Anderson and Webster, 1983; Ibáñez and Ochoa, 1985; Koopman, 1982, 1993).

This species is widely distributed in northern Argentina. The specimen cited by Ojeda and Barquez (1976) as *P. nasutus* from Formosa Province was reidentified as *P. centralis*. Thomas (1915) described *P. ancilla* based on a specimen from Cachi, Salta Province, and others from Tucumán Province. Crespo (1958) reported this species as *P. n. nasutus* in Posadas, Misiones Province, based on the dark hairs with light bases. Throughout Argentina and in other parts of its distribution this species occupies various phytogeographic regions. In general, specimens from forested regions are darker than those from arid areas. For example, those from El Cadillal, Río Loro, Tucumán Province, and Quebrada de Acambuco, 5 km W Dique Itiyuro, Salta Province, which are forested areas, are darker than those from Nueva Esperanza, Santiago del Estero Province, which is dry chaco vegetation, and those from Cachi, Salta Province, which is Monte, not Chaco, as assumed by Myers and Wetzel (1983). However, differences in color exist between specimens from distant localities within the same phytogeographic zone.

The taxonomic situation of the subspecies of *P. nasutus* is confusing and will not be resolved without a detailed revision. No characters have been found that can be used to differentiate populations from northwestern Argentina from those of the northeastern Argentina.

Distribution in Argentina.— Figure 153.

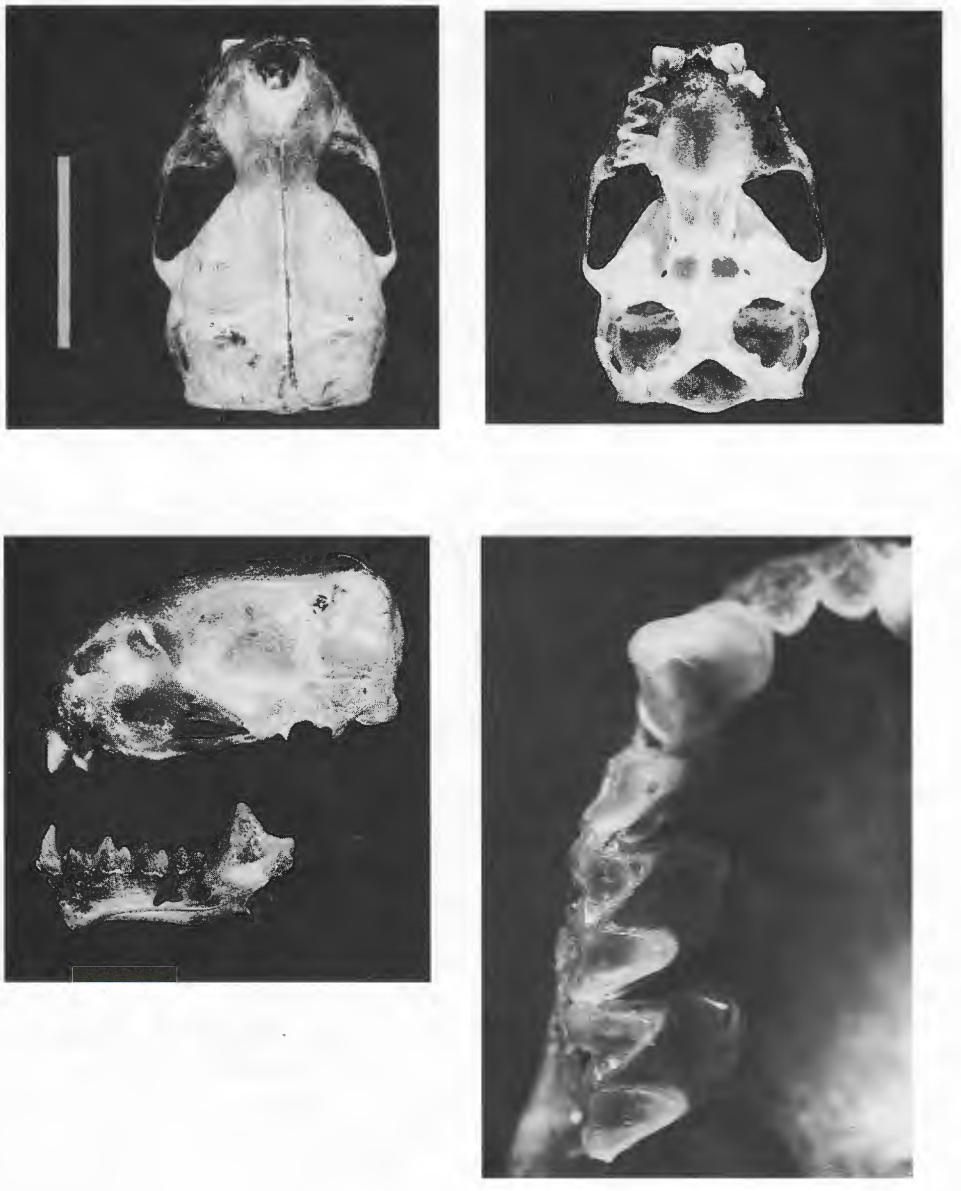


Figure 152. Skull and teeth of *Promops centralis*. Adult male from 13 km S Clorinda, Formosa Province (CML 2050). The last molar is missing. Bar = 1 cm. Teeth not to scale.

Description (Figs. 154a, 154b, 154c, 154d, 154e, and 155).— Body size is medium, with the length of the forearm ranging from 45.0 to 49.3 mm (in *P. centralis* it is greater than 50 mm). General coloration is cinnamon brown, and is darker in specimens from humid forests. In general, the bases of the hairs are paler and in some specimens form a well-differentiated white band. The ventral color is paler. The membranes and ears are variable in color, but are generally dark, almost black. Specimens from Santiago del Estero Province may be light brown. Ventrally, the hair extends to the sides of the body over the plagiopatagium as a wide band that extends from the elbow to the knee. Another less densely colored, but wide, band extends along the posterior side of the forearm, covering one-half of the metacarpal of the fifth digit and extending over the wide

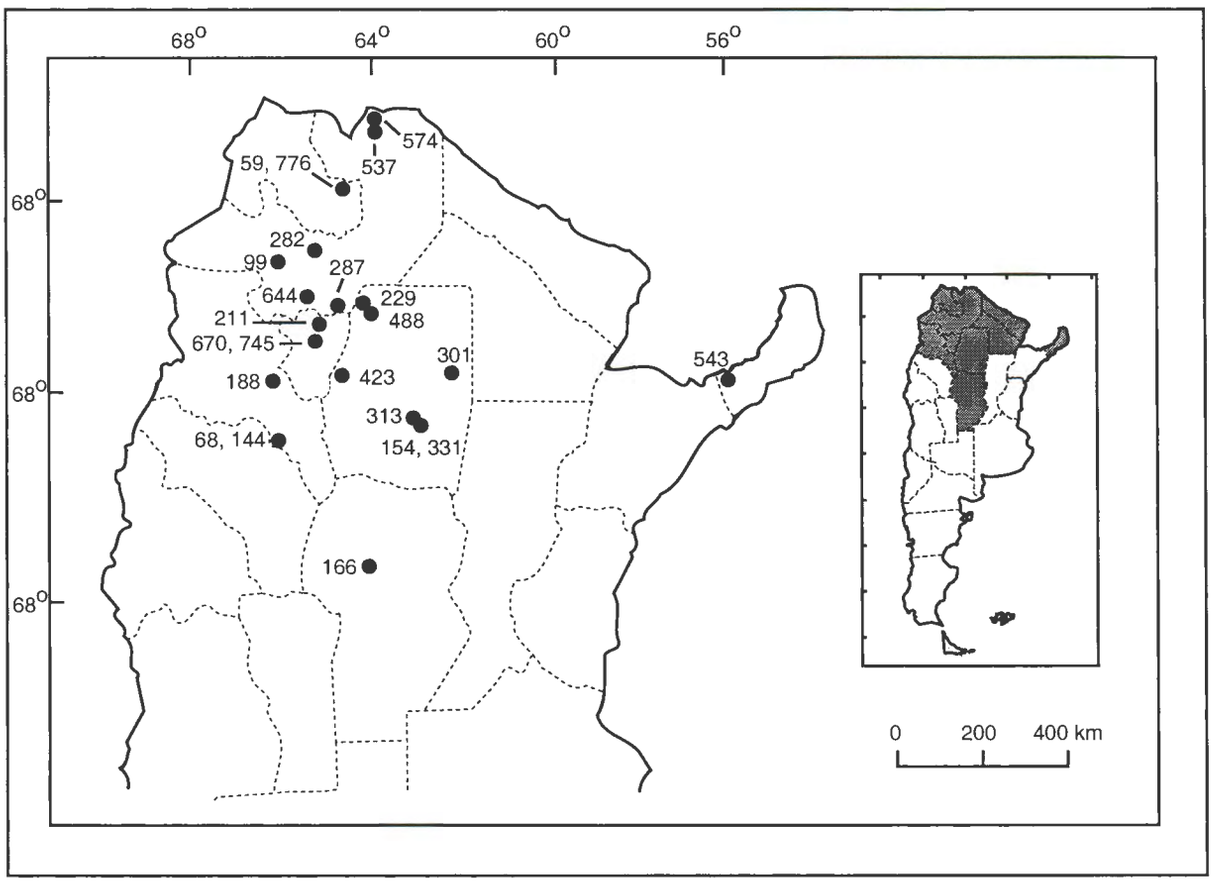


Figure 153. Map of the localities of *Promops nasutus*.

dactylopatagium. Dorsally, the hair that borders the body extends from the middle of the humerus to the knee, bordering the forearm over the plagiopatagium and covering one-half of the metacarpal of the fifth digit and all the anterior portion of the wide dactylopatagium. Some hairs are found on the dorsal and ventral sides of the uropatagium. The ears are small and rounded; when laid forward they barely extend to the corner of the eyes. The ears are separated at the forehead by a space of less than 1 mm. The ear keel is poorly developed but widens distally. The tragus is small, barely 2 mm, with a rounded tip, and a small lateral basal projection. The antitragus is long, more or less 4 mm, and is constricted at the base.

One of the most important external characters is the strongly domed keel that extends from behind the nares to between the ears. The rostrum has many folds and wrinkles that are more evident in fresh specimens or those preserved in alcohol. The lips lack warts; the upper lip has small wrinkles that do not form folds and is bordered by a fringe of long, soft hairs. The tip of the snout is covered by a patch of short, stiff hairs, that curve upwards. The tail is long and more than one-half of its length is included in the uropatagium. The calcars are more developed than in other molossids and border the uropatagium until they contact the margins of the tail. Males have a well-developed gular sack.

The skull is wide and globose and the rostrum is short; in profile the braincase is very high. The sagittal crest is well developed, but low, and reaches its greatest height at the anterior part of the braincase. The zygomatic arches are complete but thin on their posterior one-third. The palate is strongly domed, a characteristic of the genus. The basisphenoidal pits are shallow. The tympanic bulla barely covers half of the cochlea.

The dental formula is I 1/2, C 1/1, P 2/2, M 3/3, total 30. The upper incisors are thin and proodont, their tips are slightly divergent, and they completely fill the space between the canines. The P1 is reduced and diffi-

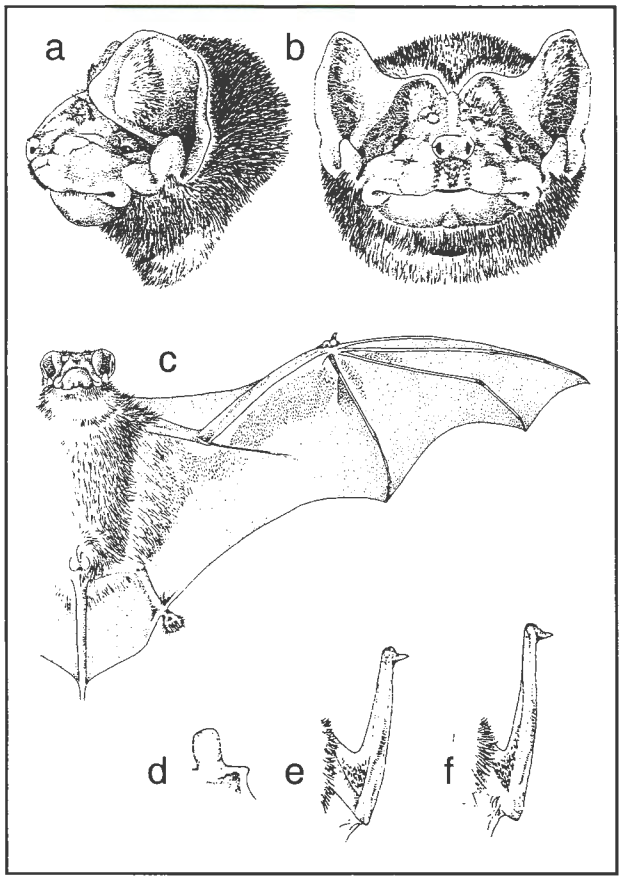


Figure 154. *Propmops nasutus* (a, b, c, d, and e) and *Promops centralis* (f): (a) face, lateral view; (b) face, frontal view; (c) body (life size); (d) tragus; (e) forearm; and (f) forearm.

cult to see without magnification; it is displaced labially. In some specimens examined, the P1 was absent, probably lost during skull cleaning. The P2 is large, triangular in profile, its cingulum oblique to the toothrow, its paracone high, and its protocone low and projecting forward. The M1 and M2 are well developed, subequal in size, have four commissures, and a hypocone that is barely present or absent. The M3 has two commissures and lacks a hypocone.

The lower incisors are bifid and completely fill the space between the canines. In some specimens the margins of i2 are entire, but i2 is always smaller than i1. The canines are well developed and their cingula are in contact at their anterior margins. The p1 is small, its anteriormost point mounted over the posterior border of the cingulum of the canine; p2 is slightly larger than p1. The m1 and m2 are complete, with the talonid and trigonid well differentiated. m3 is complete, but the distance between the hypoconid and the entoconid is reduced, giving the impression that only a single cusp is present.

Measurements.— Table 21.

Comments.— Specimens from El Cadillal, Río Loro, Tucumán Province, had scrotal testes at the end of June. A female from Nueva Esperanza, Santiago del Estero Province, was pregnant at the end of October; one from Quebrada de Acambuco, 5 km W Dique Itiyuro, Salta Province, had a 3 g fetus at the end of November. In Paraguay, specimens were not reproductively active in July and August (Myers and Wetzel, 1983).

Individuals from El Cadillal, Río Loro were captured leaving roosts located in the narrow cracks of a vertical clay cliff. Nearby were several small natural caves, but bats were not found in them. Sazima and Uieda (1977) found this species in roofs of urban dwellings, and Silva (1975) captured them in Brazil in roofs made of shingles and in a basement. Freeman (1981*a*) found much similarity between *Promops* and *Molossus* in the type of wing, but indicated that *Promops* should feed on softer insects judging by its less-robust skull and mandible. Little is known about its diet. Items in the stomachs of specimens from Tucumán Province were unidentifiable.

Specimens Examined (34).— CATAMARCA: Balneario El Caolín, 6 km NW Chumbicha, 1 (OMNH); Dique El Potrero, 1 (CM). JUJUY: Arroyo Sauzalito, Parque Nacional Calilegua, 1 (CML); Yuto, 4 (AMNH). SALTA: Cachi, 2500 m, 1 (BMNH, type of *Promops ancilla*); Finca La Cruz, 1 (CML); Finca Santa Cruz, 3 km N Las Mercedes, 1 (CML); Piquirenda Viejo, 6 km W, 1 (CML); Quebrada de Acambuco, 5 km W Dique Itiyuro, 2 (CML); San Antonio, 5 (MACN). SANTIAGO DEL ESTERO: Nueva Esperanza, 12 (2 CML, 10 MACN). TUCUMÁN: El Cadillal, Río Loro, 2 (RMB); San Miguel de Tucumán, 1 (BMNH); Tucumán, 450 m, 1 (BMNH).

Additional Records.—CATAMARCA: Chumbicha, 7 km al N (Barquez and Lougheed, 1990). CHACO: Provincia de Chaco (Cabrera, 1958); Villa Guillermina (Romaña and Abalos, 1950). CÓRDOBA: Córdoba (M. Gutierrez, J. G. Haro, and M. de los A. Bistoni, in litt.). FORMOSA: Provincia de Formosa (Cabrera, 1958). MISIONES: Posadas (Crespo, 1958).

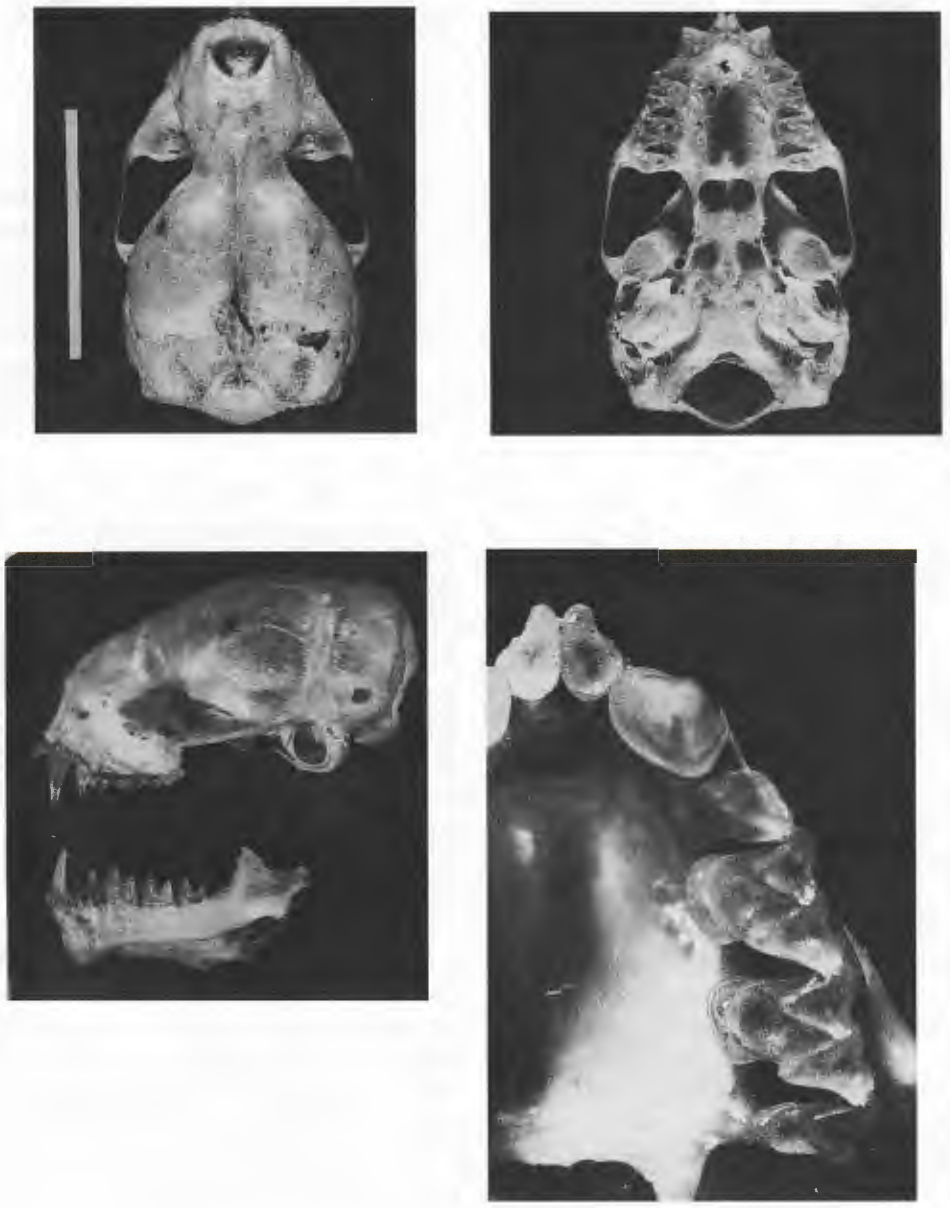


Figure 155. Skull and teeth of *Promops nasutus.* Adult female from Dique Itiyuro, Salta Province (IADIZA-CM). Bar = 1 cm. Teeth not to scale.

SANTIAGO DEL ESTERO: Colonia Dora (Yepes, 1944); El Mojón (Romaña and Abalos, 1950); El Zanjón (Romaña and Abalos, 1950); Girardet (Romaña and Abalos, 1950); Herrera (Romaña and Abalos, 1950); Icaño (Romaña and Abalos, 1950); Las Termas (Romaña and Abalos, 1950).

Table 21. Measurements of Promops centralis *and* Promops nasutus. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Promops centralis*	*Promops nasutus*
Total length	129.5 ± 3.31, 4	117.6 ± 4.61, 13
	125.0 - 133.0	109.0 - 126.0
Tail length	50.5 ± 1.91, 4	50.5 ± 2.63, 13
	48.0 - 52.0	47.0 - 58.0
Hindfoot length	10.5 ± 1.00, 4	8.2 ± 1.67, 13
	10.0 - 12.0	6.0 - 11.0
Ear length	15.6 ± 3.64, 4	13.6 ± 1.07, 13
	12.0 - 19.4	12.0 - 15.7
Forearm length	53.3 ± 0.47, 4	47.4 ± 1.16, 13
	53.0 - 54.0	45.0 - 49.3
Weight	24.2 ± 1.06, 2	15.7 ± 3.39, 7
	23.5 - 25.0	13.0 - 22.0
Condylobasal length	18.6 ± 0.50, 4	15.8 ± 0.29, 13
	18.3 - 19.4	15.5 - 16.4
Least interorbital breadth	6.7 ± 0.29, 4	5.7 ± 0.12, 12
	6.5 - 7.2	5.6 - 6.0
Zygomatic breadth	12.8 ± 0.40, 3	10.7 ± 0.19, 12
	12.6 - 13.3	10.4 - 11.2
Greatest length of skull	19.8 ± 0.45, 4	17.0 ± 0.55, 12
	19.6 - 20.5	15.6 - 17.8
Postorbital constriction	4.1 ± 0.12, 4	3.9 ± 0.11, 12
	4.0 - 4.3	3.7 - 4.1
Breadth of braincase	10.1 ± 0.26, 4	9.4 ± 0.18, 12
	9.9 - 10.5	9.1 - 9.7
Length of maxillary toothrow	7.3 ± 0.15, 3	6.3 ± 0.17, 12
	7.2 - 7.5	6.1 - 6.6
Palatal length	7.2 ± 0.25, 3	5.7 ± 0.17, 12
	7.0 - 7.5	5.5 - 6.1
Mastoidal breadth	11.8 ± 0.25, 3	10.3 ± 0.48, 12
	11.6 - 12.1	8.8 - 10.6
Length of mandibular toothrow	8.3 ± 0.46, 3	7.0 ± 0.20, 11
	8.1 - 8.9	6.7 - 7.3
Length of mandible	14.2 ± 0.25, 3	11.7 ± 0.22, 11
	14.0 - 14.5	11.4 - 12.0
C-C (width across canines)	5.0 ± 0.15, 4	4.1 ± 0.17, 12
	5.0 - 5.3	3.9 - 4.5
M-M (width across molars)	8.8 ± 0.20, 3	7.7 ± 0.39, 12
	8.7 - 9.1	7.0 - 8.1

Genus *Molossus*

This genus includes five species, all of which occur in South America, and two of which are found in Argentina (Koopman, 1993). Miller (1913*b*) revised the genus and recognized 18 species divided in four groups (*currentium, obscurus, pygmaeus*, and *rufus*) based on measurements of the forearm, skull, and distances between the upper canines. The first three species groups correspond to *M. molossus* and the fourth to *M. ater*. The most recent revision is that by Freeman (1981*a*), who recognized eight species, but doubted the validity of some.

Species of *Molossus* are similar to species of *Promops*; however in *Molossus,* the keel on the snout is straight, not domed, as in *Promops*. Based on other external characters, species of the two genera are difficult to distinguish, especially those that are similar in size. Examination of the upper and lower incisors is the best way to differentiate these genera in the field. When viewed from the front, the upper incisors of *Promops*

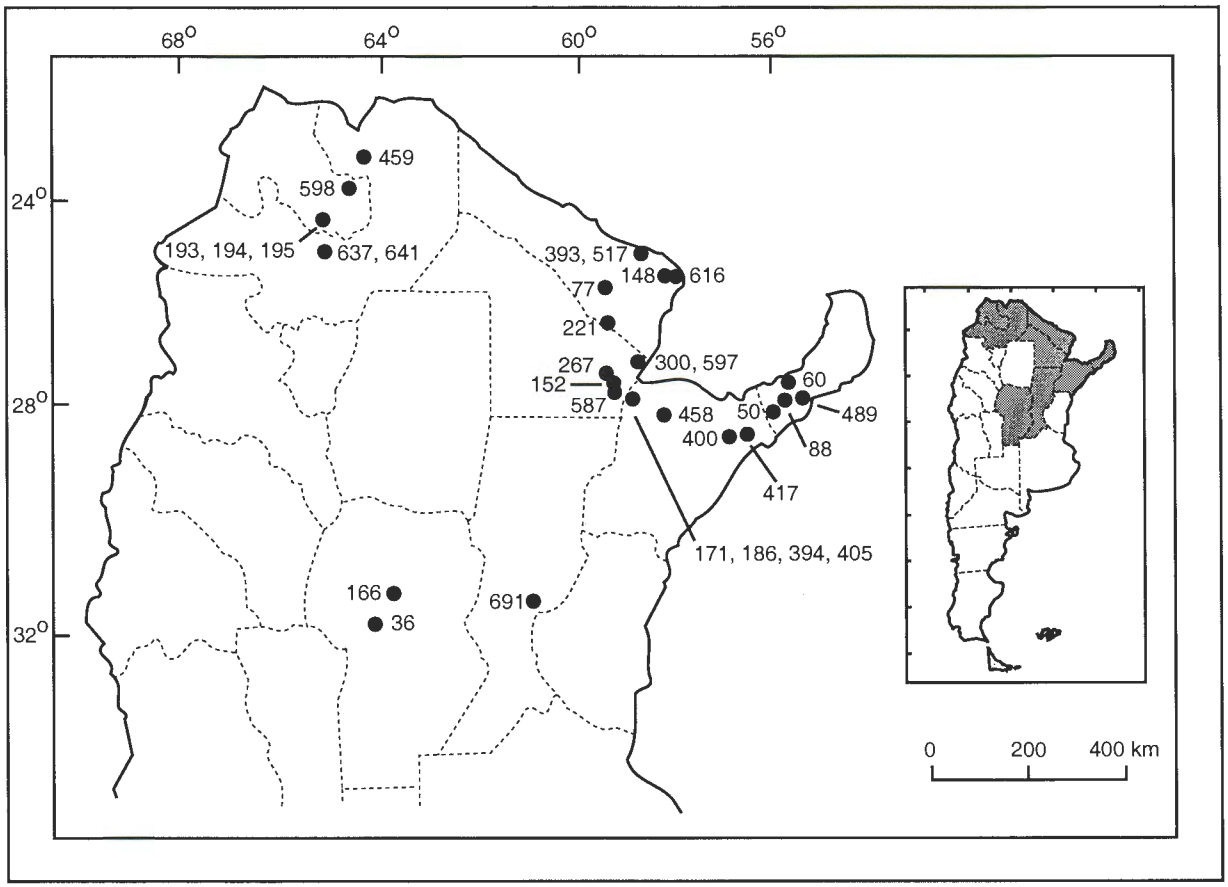


Figure 156. Map of localities of *Molossus ater.*

are not triangular and are procumbent; in *Molossus* they are triangular and project downward. *Molossus* has two lower incisors and *Promops* has four, but they are so small that it is difficult to observe them without magnification. The skulls can be easily distinguished, especially by examination of the palate.

Molossus ater É. Geoffroy St.- Hilaire

Molossus ater É. Geoffroy St.- Hilaire, Nouveau Bulletin des Sciences par la Société Philomatique, Paris, 3(96):279, 1805.

Type Locality.— Not given in the original description. The type locality was restricted to "Cayenne, French Guiana" by Goodwin and Greenhall (1961). This species frequently has been treated as M. rufus (Anderson et al., 1993; Dolan, 1989), but see Goodwin (1960), Husson (1962), and Koopman (1993) for the use of *M. ater.*

Distribution.— This species occurs from Mexico through all South American countries except Uruguay and Chile (Koopman, 1982, 1993). Cabrera (1930, 1958) limited its distribution in Argentina to the northernmost parts of the country in a narrow east-west band; he assigned specimens to the subspecies *castaneus.* Villa-R. and Villa-C. (1971) considered specimens from Salta and Jujuy as *M. a. nigricans*, but we believe that this is not correct since the type of *nigricans* is significantly larger than the specimens they examined. Specimens from Bolivia (Anderson et al., 1982), deposited in the AMNH, are assigned to *M. a. ater.* We have found no subspecific differences between specimens examined and those from eastern Argentina, mainly Chaco, Corrientes, and Formosa provinces. A large series of specimens from Corrientes showed extensive intrapopulation variation, however, particularly in color. Therefore, eastern and western populations cannot be separated, and the characters and measurements of the bats from one region overlap with those from the other. We are not able to assign Argentine specimens to a subspecies at this time.

Distribution in Argentina.— Figure 156.

Description (Figs. 157 and 158).— Body size is large size, notably larger than *M. molossus*; length of forearm varies from 47 to 54 mm. The general appearance is similar to *Promops centralis*. The dorsal color is dark brown, with the bases of the hairs lighter; ventral coloration is paler. Within the same colony individuals may exhibit two color phases—a black phase and a red phase—in which the tips of the dorsal hairs are bright cinnamon and their bases orange. The membranes are dark. The hair extends over the body as in *Promops*, but is less dense, especially over the fifth metacarpal. Long, fine hairs cover the base of the uropatagium; these are not found in *Promops*. The ears are medium in size, semicircular, and separated by a larger space than is present in *Promops*. The ear keel is well defined, but not very wide at its posterior tip. The antitragus is well developed, higher than it is wide, and its base is slightly constricted. The tragus is small, elongate, with a rounded tip, and with a basal expansion that is less evident than that of *M. molossus*. The rostral keel is prominent, straight, and not elevated as in *Promops*. The lips, rostrum, and moustache are as in *M. molossus*.

The dental formula and skull are as in *M. molossus*, but are larger and the sagittal crest is well developed.

Measurements.— Table 22.

Comments.— Little is known about the biology of this species in Argentina, and few data exist for other regions. Marques (1986) conducted an extensive, two-year study of a large colony of these bats living in a roost in a house in Manaus, Brazil. She found that *M. ater* reproduces year-round in the Amazon; there is lessened reproductive activity at the end of the rainy season, and increased reproduction during the dry season. Brosset and Dubost (1967) and Brosset and Charles-Dominique (1990) reported that *M. ater* frequents rain forest habitats and disturbed areas around villages in French Guiana. Individuals have been found roosting in the roof of an uninhabited building and in the hole of a tree (*Pinus* sp.) in General Vedia, Chaco Province (Fornes and Massoia, 1967); Villa-R. and Villa-C. (1971) and Myers and Wetzel (1983) found roosts in the roofs of dwellings. A group of individuals was captured in Mbariguí, Corrientes Province, from the hole of a trunk of an exotic tree-of-paradise; others were captured as they flew over patios in the city of Resistencia, Chaco Province. Three pregnant females (CRL = 18, 32, and 39 mm) were collected in Resistencia at the end of October. A pregnant female and a young (nursing) individual were captured in Laguna Paiva, B° Las Lomas, Corrientes Province in mid-January. A young individual with deciduous dentition was also captured at the beginning of March in Río Paraguay, Bouvier, Formosa Province. This specimen still had deciduous dentition with four upper incisors; I2 was small, thin, and bilobed. Three lower incisors also were present, two of them from each side were displaced labially. In Paraguay, Myers and Wetzel (1983) found lactating females and a young individual in January .

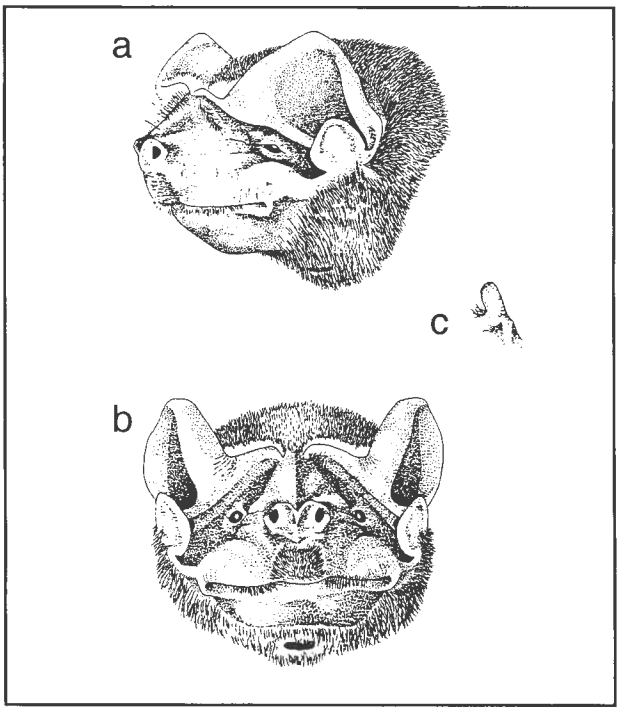


Figure 157. *Molossus ater*: (a) face, lateral view; (b) face, frontal view; and (c) tragus.

The diet consists of insects, primarily of the orders Coleoptera and Hymenoptera. Freeman (1979) reviewed the feeding habits of this species. Pine (1969) reported a preference for Hymenoptera; Howell and Burch (1974) found that this species consumed a mixture of Coleoptera, Orthoptera, and Hymenoptera. These bats have been found in owl pellets of *Tyto alba* in Misiones Province (Massoia et al., 1989*a*; Massoia et al. 1989*a*, 1989*d*).

Figure 158. Skull and teeth of *Molossus ater*. Adult male from Laguna Paiva, Corrientes Province (OMNH 18820). Bar = 1 cm. Teeth not to scale.

Specimens Examined (71).— CHACO: Colonia Benítez, 2 (FCM); Estancia San Miguel, along Hwy 90, 15 km NW jct. Hwy 90 and Hwy 11, 6 (3 CML, 2 IADIZA-CM, 1 OMNH); General Vedia, 1 (MACN); Resistencia, 4 (OMNH); Río de Oro, General Vedia, 1 (FCM). CÓRDOBA: Córdoba, 1 (CEM). CORRIENTES: Corrientes Capital, Escuela 599, 4 (CML); Laguna Brava, 1 (OMNH); Laguna Galarza, 1 (OMNH); Laguna Paiva, B° Las Lomas, 15 (OMNH); Las Marías, 2 (CML); Manantiales, 1 (MACN); Mbariguí, 22 (OMNH). FORMOSA: Bartolomé de Las Casas, 1 (CML); Clorinda, 13 km al S, sobre ruta 11, 1

(CML); El Colorado, 2 (MACN); Río Paraguay, Bouvier, 1 (OMNH). JUJUY: Río de Zora y cruce con ruta 34, 1 (CML). MISIONES: Bonpland, 2 (TCWC). SALTA: Manuel Elordi, Vermejo, 500 m, 1 (BMNH). SANTA FE: Santa Fe, 1 (MFA).

Additional Records.— CÓRDOBA: Alta Gracia (Fornes and Massoia, 1967). CORRIENTES: Desaguadero, Escuela 208, Ruta Provincial 5, a 20 km de Corrientes (Massoia et al., 1990); Ensenadita (Massoia et al., 1988). FORMOSA: Laguna Blanca (Massoia, 1970); Parque Nacional Río Pilcomayo (S. Heinonen F. and R. M. Barquez, in litt.). JUJUY: Dique La Ciénaga (Villa-R. and Villa-C., 1971); Dique La Ciénaga, 13 km SSW S. S. de Jujuy (Villa-R. and Villa-C., 1971); Dique La Ciénaga, casa del club náutico, 30 km SSW San Salvador de Jujuy, 1000 m (Villa-R. and Villa-C., 1971). MISIONES: Apóstoles (Massoia et al., 1989*a*); Arroyo Yabebyri, entre Loreto y el Arroyo Yabebyri, sobre ruta 12 (Massoia et al., 1989*d*); Departamento Capital (Massoia, 1980); Departamento Guaraní (Massoia, 1980); Oberá (Massoia and Chebez, 1989). SALTA: Salta (Villa-R. and Villa-C., 1971); Salta, ciudad (Villa-R. and Villa-C., 1971).

Molossus molossus (Pallas)

V. (espertilio) molossus, Pallas, Miscellanea zoologica, quibus nov imprimis atque obscur animalium species describuntur et observationibus i conibusque illustrantur. Hagae Comitum, apud Petrum van Cleef, p. 49-50, 1766.

Molossus molossus Husson, Zoölogische Verhandelingen, Leiden, 58:251, 1962.

Type Locality.— France, Martinique, Lesser Antilles.

Distribution in South America.— This species is found from Mexico and the Caribbean to northern Argentina (Koopman, 1993). The taxonomic relationships of the South American subspecies are unclear, but populations that inhabit Argentina should be treated as a single subspecies.

Molossus molossus crassicaudatus

É. Geoffroy St.- Hilaire

Molossus crassicaudatus É. Geoffroy St.- Hilaire, Annales du Muséum d'Histoire Naturelle, Paris, 6:156, 1805.

Molossus molossus crassicaudatus: Anderson et al., American Museum Novitates, 2750:12, 1982.

Type Locality.—Paraguay, restricted to Asunción by Cabrera (1958).

Distribution in Argentina.— Figure 159.

Description (Figs. 160 and 161).— Body size is medium; length of forearm ranges from 38.0 to 42.0 mm. The dorsal color is grayish brown or reddish brown, and the bases of the hairs are lighter (generally cream), but never immaculate white. The dorsum may be dark, even almost black. The venter is paler. Some specimens from the forests of northern Salta Province are reddish brown in color and have black wings. In other areas, individuals are generally paler.

The distribution of the hair over the membranes is similar to that of *Promops*, but the hair is less dense and extends slightly more over the dorsum of the uropatagium. The ears are medium-sized and slightly more triangular than in *Promops*; when laid forward they do not extend past the tip of the snout. The ear keel is well defined, but not widened terminally. The antitragus is well developed and barely constricted basally. The tragus is small, about 2 mm high. The snout has a prominent keel, as well-marked as in *Promops*, but lower and straight, rather than convex. The lips are smooth, without folds or wrinkles, the upper has a fringe of hairs that form an upwardly projecting moustache. The calcar is well developed, but does not reach the tail as it does in *Promops*.

The skull is robust, with a short rostrum, and is similar in appearance to *P. nasutus*. The braincase is globose. The sagittal crest is well developed, but lower than in *M. ater*. The lambdoidal and sagittal crests are joined in males, but separated in females. The zygomatic arches are thin and complete, and slightly thicker anteriorly, although they do not form a true postorbital process of the jugal. The palate is flat compared to *Promops*. The pterygoids are parallel and extend to the anterior margin of the shallow basisphenoidal fossae.

The dental formula is I 1/1, C 1/1, P 1/2, M 3/3, total 26. The upper incisors are triangular when viewed from the front, their internal margins in contact with one another. In general, they fill the space between the canines, but in some specimens a small diastema may be present. The premolars and molars are essentially as

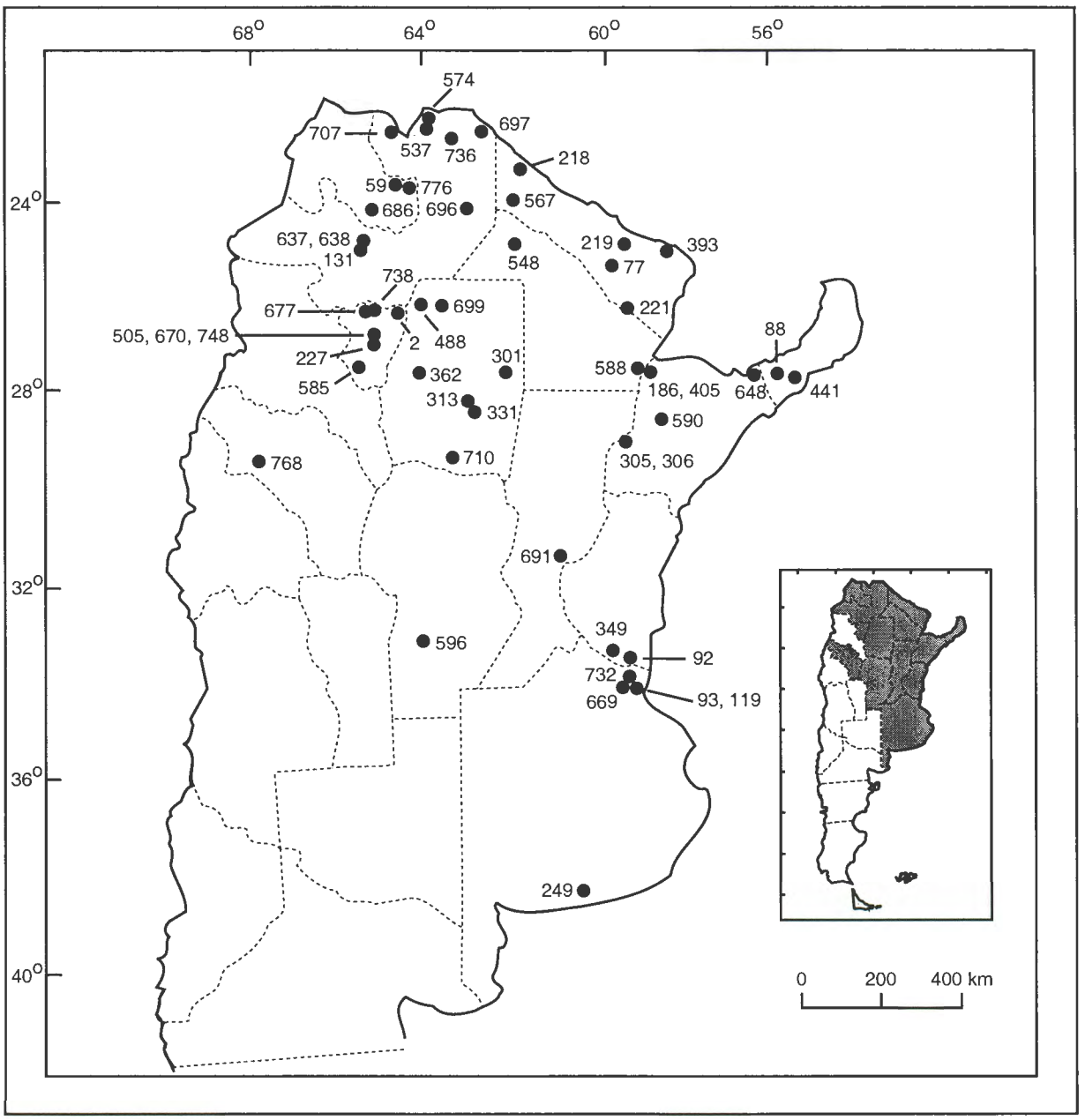


Figure 159. Map of the localities of *Molossus molossus*.

in *Promops* and *M. ater*. The two lower incisors are small, in contact along their internal margins, and are lower than the cingulum of the canines; their margins are bilobed. Other characters are as in *P. nasutus*.

Measurements.— Table 22.

Comments.— This is a common species in natural, urban, and suburban areas in Argentina and in other parts of its geographic range (e.g., Brosset and Charles-Dominique, 1990, for French Guiana). Individuals form large colonies or groups that roost in holes in trees, cracks, caves, between palm leaves, and in man-made constructions, principally tunnels, pipes, bridges, and roofs. Specimens from Laguna Paiva, B° Las Lomas, Corrientes Province, were collected while asleep between the leaves of orange trees. In Bolivia, individuals (in a ratio of 3 females:1 male) were caught as they left their roosts in the roofs of rural dwellings (Barquez,

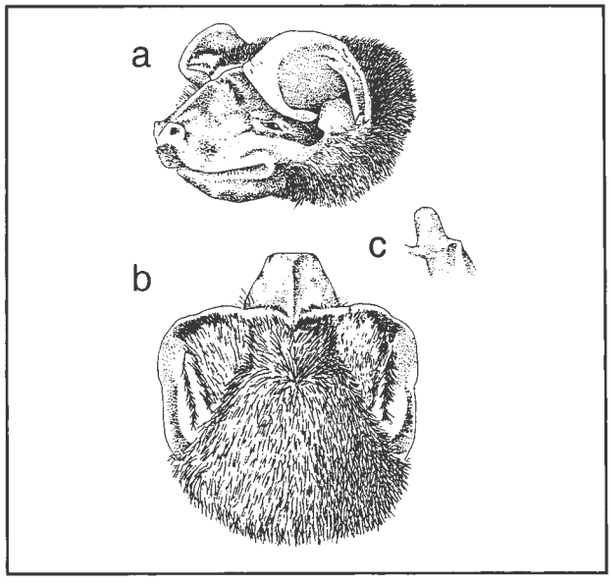


Figure 160. *Molossus molossus*: (a) face, lateral view; (b) head, dorsal view; and (c) tragus.

1983). Fornes and Massoia (1967) found this species in association with *Tadarida brasiliensis*, *Eumops bonariensis* (probably *Eumops patagonicus*), *Eptesicus brasiliensis* (probably *Eptesicus furinalis*), and *Myotis* sp. Insects, especially coleopterans, were the preferred food in Bolivia (R. M. Barquez, personal observation). These bats were found to be eaten by barn owls (*Tyto alba*) in eastern Argentina (Massoia, 1989; Massoia et al., 1989*b*, 1990).

Sexual dimorphism has been reported for this species (Genoways et al., 1981; Myers and Wetzel, 1983; Tamsitt and Valdivieso, 1966). Males are larger than females.

Little is known about the reproductive biology of *Molossus molossus*. A female from Quebrada de Acambuco, 5 km W Dique Itiyuro, Salta Province, captured at the end of November, had a well-developed fetus. At El Cogoik, 5 km antes de, Formosa Province, a male with scrotal testes was collected in mid-May (winter); a female from El Colorado, Formosa Province (MACN) was pregnant at the end of January. Young individuals have been observed in the Capital Federal, Buenos Aires, at the beginning of February, in Salta, Capital, in the middle of March, and in the city of San Miguel de Tucumán at the end of December (R. M. Barquez, personal observation). Myers and Wetzel (1983) reported pregnant females in September and November in the chaco of Paraguay. Racey (1982) maintained harems of these bats in captivity for three years under conditions of controlled light (12 hours of light and 12 of darkness). Results indicated that photoperiod does not control the time of estrus or ovulation.

Specimens Examined (198).— BUENOS AIRES: Buenos Aires, 1 (MACN); Capital Federal, 3 (2 MACN, 1 TTU); Energía, 1 (MACN); Tigre, 1 (TTU). CHACO: Pozo del Gato, 2 (CML); Resistencia, 20 km N, 1 (MLP). CORRIENTES: Goya, 11 (10 BMNH, 1 USNM); Goya, 600 m, 1 (BMNH); Laguna Paiva, B° Las Lomas, 3 (OMNH); Manantiales, 1 (MACN); Rincón de Luna, 1 (MACN); San Borgita, 1 (ROM). ENTRE RÍOS: Brazo Largo, 2 (TTU); Islas del Ibicuy, 1 (TTU). FORMOSA: El Churcal, approx. 10 km SSE Buena Vista, 2 (1 IADIZA-CM, 1 OMNH); El Cogoik, 5 km antes de, 1 (CML); El Colorado, 4 (2 CML, 2 MACN); Puesto Divisadero, 35 km S, 5 km E Ing. Guillermo N. Juárez, 5 (3 CML, 2 IADIZA-CM). JUJUY: Arroyo Sauzalito, Parque Nacional Calilegua, 1 (CML); Yuto, 2 (AMNH). MISIONES: Bonpland, 2 (MACN). SALTA: Cerrillos, 1 (TTU); Piquirenda Viejo, 6 km W, 1 (CML); Quebrada de Acambuco, 5 km W Dique Itiyuro, 3 (2 OMNH, 1 RAO); Salta, 3 (MACN); Salta Capital, 41 (12 MACN, 29 TTU); Santa Rosa, 38 (CML); Santa Victoria Este, 11 (3 MACN, 8 TTU); Serranía de Las Pavas, 2 (SIG); Tonono, 1 km E sobre Río Itiyuro, 2 (CML). SANTA FE: Santa Fe, 1 (MFA). SANTIAGO DEL ESTERO: Antilla, 1 (TTU); Nueva Esperanza, 38 (5 MACN, 33 TTU); Santo Domingo, 1 (CML). TUCUMÁN: El Manantial, 1 (CML); Reserva Provincial Santa Ana, Remanso del Gallego, 1 (CML); San Miguel de Tucumán, 3 (2 CML, 1 SIG); San Pedro de Colalao, 1 (CML); Trancas, 1 (CML); Tucumán, Ciudad, casa céntrica, 1 (OMNH).

Additional Records.— BUENOS AIRES: San Miguel (Massoia, 1989). CÓRDOBA: Río Cuarto (Tiranti and Torres, 1998). CORRIENTES: Desaguadero, Escuela 208, Ruta Provincial 5, a 20 km de Corrientes (Massoia et al., 1990). FORMOSA: Bartolomé de Las Casas (Massoia, 1970); Laguna Blanca (Massoia, 1970). JUJUY: San Salvador de Jujuy, 20 km W (Villa-R. and Villa-C., 1971). LA RIOJA: Villa Unión (Vaccaro, 1992). MISIONES: Los Helechos, Escuela n° 12 (Massoia et al., 1989*b*). SANTIAGO DEL ESTERO: Girardet (Romaña and Abalos, 1950); Herrera (Romaña and Abalos, 1950); Icaño (Romaña and Abalos, 1950); La Banda (Romaña and Abalos, 1950);

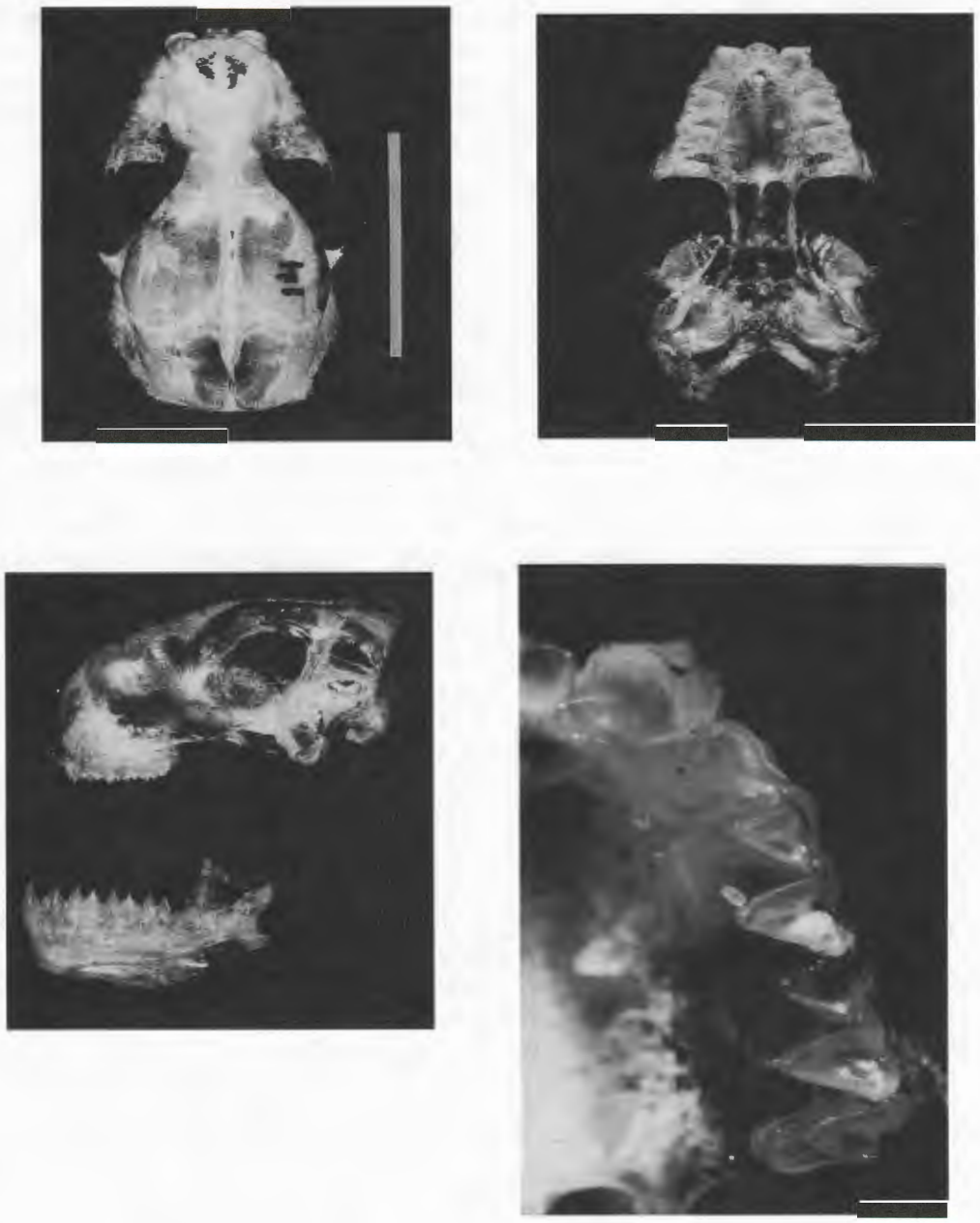


Figure 161. Skull and teeth of *Molossus molossus*. Adult male from San Miguel de Tucumán, Tucumán Province (SIG 14). Bar = 1 cm. Teeth not to scale.

Sumampa (Romaña and Abalos, 1950). TUCUMÁN: 7 de Abril (Romaña and Abalos, 1950); Parque 9 de Julio, Tucumán (Romaña and Abalos, 1950).

ERRATA – Special Publication 44, *The Bats of Argentina*, by Barquez, Mares, and Braun, 1999. This table should have appeared on page 225.

Table 22. Measurements of Molossus ater *and* Molossus molossus. *For a description of the measurements, see the Materials and Methods. Mean, standard deviation, and sample size are followed by range.*

Variable	*Molossus ater*	*Molossus molossus*
Total length	129.3 ± 5.52, 48	100.2 ± 6.27, 30
	120.0 – 140.0	90.0 –114.0
Tail length	47.8 ± 3.42, 48	37.1 ± 3.43, 30
	40.5 – 55.0	30.0 – 44.0
Hindfoot length	13.5 ± 2.05, 48	8.5 ± 1.58, 27
	9.0 – 20.0	6.0 – 12.0
Ear	17.5 ± 2.18, 48	13.2 ± 1.86, 28
	11.0 – 21.0	9.0 – 18.0
Forearm length	49.9 ± 1.54, 47	39.8 ± 2.49, 28
	46.6 – 54.0	29.0 – 43.0
Weight	30.7 ± 6.12, 40	14.7 ± 1.89, 16
	21.0 – 43.0	12.0 – 18.0
Condylobasal length	19.7 ±0.59, 45	15.3 ± 0.80, 30
	18.7 – 21.0	13.0 – 17.2
Least interorbital breadth	6.8 ± 0.38, 44	5.4 ± 0.37, 30
	6.0 – 7.7	4.6 – 6.3
Zygomatic breadth	13.7 ± 0.49, 38	10.9 ± 0.50, 23
	12.7 – 14.8	10.2 – 12.0
Greatest length of skull	21.6 ± 0.74, 44	16.6 ± 0.84, 30
	20.4 – 23.4	15.0 – 18.6
Postorbital constriction	4.4 ± 0.17, 48	3.7 ± 0.25, 30
	4.2 – 4.8	3.3 – 4.3
Breadth of braincase	10.8 ± 0.27, 45	8.8 ± 0.35, 30
	10.4 – 11.4	8.0 – 9.6
Length of maxillary toothrow	8.1 ± 0.23, 47	6.1 ± 0.31, 30
	7.7 – 8.7	5.5 – 6.2
Palatal length	7.0 ± 0.29, 33	5.4 ± 0.36, 26
	6.4 – 7.6	4.8 – 6.2
Mastoidal breadth	13.4 ± 0.56, 42	10.4 ± 0. 51, 27
	11.8 – 14.7	9.3 – 11.3
Length of mandibular toothrow	8.9 ± 0.28, 43	6.9 ± 0.31, 26
	8.2 – 9.5	6.4 – 7.5
Length of mandible	15.5 ± 0.44, 43	11.9 ± 0.50, 26
	14.8 – 16.5	11.1 – 13.1
C-C (width across canines)	5.8 ± 0.29, 42	4.3 ± 0.27, 25
	5.2 – 6.5	4.0 – 5.0
M-M (width across molars)	10.0 ± 0.32, 46	7.8 ± 0.36, 27
	9.2 – 10.8	7.0 – 8.4

DISCUSSION

Are the bats of Argentina well-studied?— Argentina has been visited by zoologists for more than a century, and although a good deal of collecting effort has been expended on mammals in general, much less attention has been paid to bats. Most field work has occurred only over the last few decades, and we found that most of the localities for bats come from isolated observations of one or only a few specimens. We examined the distribution of bat collecting localities in Argentina to discern the evenness of the collecting effort in the country. Of Argentina's 23 provinces, fewer than half (11) have more than 20 bat localities (Table 23). The five provinces that have been most completely sampled (i.e., have the most collecting localities—Tucumán, Salta, Misiones, Buenos Aires, and Jujuy) account for 53% of all bats ever collected in Argentina, but contain only 25% of the country's total area. Thus, over half of the collecting effort for bats (1,991 specimens) has been concentrated in only one-fourth of the country. Few people have studied Argentine bats to any significant degree, and survey research in these five provinces has been due mainly to the field efforts of a few workers (R. M. Barquez, M. A. Mares, C. C. Olrog, R. A. Ojeda, and A. Fornes) in Tucumán, Salta, and Jujuy provinces; J. Crespo, and E. Massoia in Misiones; and J. Crespo in Buenos Aires). Most of this collecting was done after 1970.

Not only have Argentine bats failed to receive much attention from field collectors, but few taxa in

Table 23. Number of bat species recorded, localities surveyed, and specimens collected in each political province and territory of Argentina, the Malvinas (Falkland) Islands, and aboard a ship in the Atlantic Ocean. Two specimens that have unassigned localities are not included; total number of specimens is 3,730.

Province	Number of Species per Province	Number of Localities per Province	Number of Specimens Examined per Province
Tucumán	27	141	622
Salta	33	139	663
Misiones	37	70	283
Buenos Aires	14	65	165
Jujuy	26	62	258
Córdoba	15	53	124
Catamarca	13	45	415
Santiago del Estero	21	43	177
Formosa	28	32	119
Corrientes	27	32	269
Chaco	24	27	181
Santa Fe	17	20	40
Río Negro	8	17	31
Mendoza	5	17	100
San Luis	5	14	52
Neuquén	7	13	42
Entre Ríos	10	12	46
La Rioja	10	12	56
Chubut	6	11	35
San Juan	5	8	15
La Pampa	7	7	20
Santa Cruz	1	3	13
Malvinas	1	1	0
Atlantic Ocean	1	1	1
Tierra del Fuego	1	1	1
TOTAL		846	3728

Table 24. Species of bats of Argentina and numbers of specimens examined (rank ordered).

Species	Specimens Examined	Species	Specimens Examined
Tadarida brasiliensis	502	*Lasiurus varius*	15
Sturnira lilium	420	*Tonatia bidens*	13
Myotis levis	379	*Myotis keaysi*	12
Eptesicus furinalis	210	*Platyrrhinus lineatus*	11
Molossus molossus	198	*Eptesicus brasiliensis*	9
Eumops patagonicus	171	*Anoura caudifer*	8
Molossops temminckii	166	*Artibeus fimbriatus*	8
Desmodus rotundus	144	*Carollia perspicillata*	8
Artibeus planirostris	135	*Nyctinomops macrotis*	8
Lasiurus blossevillii	134	*Cynomops planirostris*	7
Sturnira erythromos	116	*Sturnira oporaphilum*	7
Myotis nigricans	107	*Cynomops abrasus*	6
Histiotus macrotus	104	*Eumops glaucinus*	6
Lasiurus cinereus	89	*Eumops auripendulus*	5
Myotis albescens	85	*Histiotus magellanicus*	5
Eumops perotis	78	*Eumops dabbenei*	4
Molossus ater	71	*Glossophaga soricina*	4
Noctilio leporinus	67	*Promops centralis*	4
Histiotus montanus	56	*Diaemus youngii*	3
Myotis chiloensis	48	*Histiotus velatus*	3
Artibeus lituratus	45	*Molossops neglectus*	3
Dasypterus ega	41	*Myotis ruber*	3
Eumops bonariensis	41	*Nyctinomops laticaudatus*	2
Pygoderma bilabiatum	37	*Cynomops paranus*	1
Promops nasutus	34	*Macrophyllum macrophyllum*	1
Myotis riparius	30	*Myotis simus*	1
Noctilio albiventris	27	*Vampyressa pusilla*	1
Chrotopterus auritus	21	*Myotis aelleni*	0
Eptesicus diminutus	16	TOTAL	3,730

Argentina have been given serious consideration by taxonomists. In part, this may be due to the paucity of the specimens, as well as the fact that bat specimens from the country are dispersed in collections throughout the world. Only Cabrera (1958) attempted a taxonomic overview of Argentine bats as part of his general revision of South American mammals, and many of his taxonomic decisions were made with little comment as to the reasons behind those decisions.

The present taxonomic review is thus the first review of the systematic and biogeographic status of Argentina's bat fauna. We raise several taxonomic questions that will require additional systematic work for clarification and point out where specimens are available to help answer these questions. However, it is clear that in order to understand Argentina's bats in any fundamental way, extensive field work is required. If we exclude the five provinces mentioned above, almost 75% of this large nation (including an area more than twice the size of Texas extending from tropical forests at 21°S to cold deserts and wet forests at 66°S), has had only 1,737 specimens collected from 369 localities (Table 23). By comparison, Findley et al. (1975) listed 7,127 specimens of bats from New Mexico (314,938 square kilometers, or 11% the size of Argentina), and Hoffmeister (1986) listed 4,163 specimens of bats from Arizona (295,275 square kilometers, also about 11% the size of Argentina). Together, these two southwestern states encompass an area less than 25% the size of Argentina, but have had three times more bats collected within their boundaries than all of Argentina. Moreover, Arizona and New Mexico together support 29 species of bats, one-half the number found in Argentina.

The frequency with which species are collected is also highly variable. Of the 57 species recorded for Argentina, only 13 (28% of the fauna) are known from more than 100 specimens (Table 24), and these 13 account for 2,786 specimens—75% of all specimens known from the country. Three species alone (*Tadarida brasiliensis, Sturnira lilium*, and *Myotis levis*) account for 35% of all bats collected in Argentina. Thus, although we examined 3,730 specimens from 846 localities distributed among all provinces, the Malvinas (Falklands) Islands, one locality on a ship at sea, and two unassigned localities, Argentina cannot be considered to be well studied from the standpoint of its bat fauna.

These caveats notwithstanding, Argentina's bat fauna is richer than was previously thought (we presented initial non-technical results in Barquez et al., 1993). For example, Cabrera (1958) reported 35 species and subspecies for the country, a number that has increased considerably over the intervening four decades. In the present study, 57 species, 26 genera, and 4 families were considered. The Family Vespertilionidae is the most speciose, containing 36% of all bats in Argentina, followed by the Molossidae (35%), Phyllostomidae (26%), and Noctilionidae (3%). We examined most of the known specimens and summarize our observations below.

Taxonomic commentary.— Our research has resulted in a number of changes in taxonomic constructs, including new binomial combinations, refinement of subspecific boundaries and species distributions, and clarification of species relationships.

For the Family Noctilionidae, both species known for the family (*Noctilio leporinus rufescens* and *N. albiventris*) occur in Argentina. Populations of *N. albiventris* that inhabit Argentina frequently have been treated as *N. a. cabrerai*, whose subspecific validity we question. The analysis of specimens from different parts of the distribution of the species suggests that subspecific characters vary greatly. Although *N. albiventris* from Argentina might be expected to belong to the subspecies *cabrerai*, we show that they are closer to the subspecies *affinis*. Insufficient specimens are available to clarify the subspecific situation in this species, however, and taxonomic questions will be difficult to resolve without a complete study of the species throughout its range.

The Family Phyllostomidae is represented by 5 subfamilies, 13 genera, and 17 species (subfamilial arrangement follows Jones and Carter, 1976). Specimens originally reported as *T. silvicola* from the provinces of Jujuy (Fornes et al., 1967) and Misiones (Villa-R. and Villa-C., 1971) are here correctly identified as *Tonatia bidens* (which has been considered to be an insectivorous species, but our data show that it is also carnivorous). *Glossophaga soricina* was previously reported from northwestern Argentina (Barquez, 1985). An examination of specimens in the MLP collection confirmed the presence of this species in the city of La Plata, as was indicated by Cabrera (1930). *Anoura caudifer* is included in the fauna of Argentina; the earlier citation of *A. geoffroyi* was based on misidentified specimens of *A. caudifer* (Barquez, 1984*a*; Fornes, 1972*a*; Olrog and Barquez, 1979). Consequently, *A. geoffroyi* is removed from Argentina's bat fauna.

A specimen of *Sturnira lilium* in the BMNH likely represents the southernmost record for a phyllostomid. All Argentine specimens of *Sturnira* cited previous to Barquez (1987) were identified as *S. lilium*, but many may have been incorrectly identified and confused with *S. erythromos* or *S. oporaphilum*. Both are reported in detail herein and described for the first time from Argentina. Both species are widely distributed in northwestern Argentina and are sympatric in many localities. *S. erythromos* occurs over much of Salta, Jujuy, Tucumán, and Catamarca provinces. Although it is well known from high altitudes, some lowland localities are at the limits of the montane forest and chaco at elevations below 500 m. *S. oporaphilum* is known from only seven localities in Salta, Jujuy, and Tucumán, but this species could be more widely distributed and abundant than the data indicate, since it is also easily confused with *S. lilium*.

Platyrrhinus lineatus is poorly known in Argentina and is reported from the provinces of Chaco, Formosa, Corrientes, and Misiones. Its presence in the province of Entre Ríos is also highly probable, judging from the records from Uruguay reported by Ximenez (1969) and Gonzalez and Vallejo (1980).

The Genus *Artibeus* is one of the most taxonomically complex taxa in the Neotropics, and the taxonomy of its species has varied greatly over time (e.g., Handley, 1987, 1989, 1991). Our research indicates that all previous records of *A. jamaicensis* from northwestern Ar-

gentina correspond to *A. planirostris fallax*. This differs with Handley's (1991) review, which suggests that *A. planirostris* is a subspecies of *A. jamaicensis*. We believe that the form that occurs in Argentina is, indeed, *fallax*, but that its species is *planirostris*, rather than *jamaicensis*. With respect to other species of *Artibeus* in Argentina, *A. lituratus* is restricted to the northeastern provinces of Corrientes, Formosa, and Misiones. Earlier records for *A. lituratus* from northwestern Argentina pertain to *A. planirostris*. A third species, *A. fimbriatus*, is included in the fauna of the country, although it is known from only eight specimens collected in Chaco, Formosa, and Misiones provinces.

Pygoderma bilabiatum is found in the Yungas forest and in the Paranean phytogeographic province (discussed below). Different subspecies occur in these areas according to Owen and Webster (1983), but our data are not extensive enough to clarify the subspecific situation.

The Family Vespertilionidae is represented in Argentina by 5 genera and 20 species. The Genus *Myotis* contains nine species, all of them poorly known with respect to ecology, distribution, and taxonomy. *M. aelleni* is retained in the fauna of the country because we have been unable to examine the holotype or type series, but its validity as a species is problematic. *M. albescens* was previously known from only a few records in Argentina, and we have added many new localities. *M. keaysi* was known only from high elevations (mostly from localities above 2,000 m) along the main Andean cordillera from Colombia to Bolivia, but we have extended its distribution in Argentina as far south as southern Tucumán Province. It occurs in transitional and montane forests near chacoan vegetation, where it is isolated from the main Andean mountain chain to the west. We have verified the occurrence of *M. chiloensis* in Argentina in westcentral and northwestern Patagonia, and have shown *M. riparius* to have a distribution that extends widely across northern Argentina, rather than being limited to the northeastern rain forests of the country, as was previously thought.

Three species of *Eptesicus* are found in Argentina. The mid-sized *E. furinalis* overlaps in external and cranial measurements with both the larger and smaller species, and thus the identities of all three species have been confused due to the lack of comparative material in collections. We restrict *E. brasiliensis* to the type locality of *E. b. argentinus* (Corrientes Province) and (probably) to two additional localities [one in Corrientes Province (Romaña and Toranzos, 1947) and one in Chaco Province (Massoia, 1976)]. Should additional material show that this form is, in fact, a distinct species from *E. brasiliensis* to the north, it would be *E. argentinus*, as originally described. *E. furinalis findleyi* Williams is placed in synonymy with *E. f. furinalis*, its subspecific validity doubtful given that diagnostic characters vary across the geographic range of the species.

The Genus *Histiotus* is another complicated taxon. *H. macrotus laephotis* (and not *H. montanus*, as has been reported by various authors, e.g., Koopman, 1982; Mares et al., 1981), inhabits the Yungas forests and adjoining habitats of northwestern Argentina. *H. macrotus macrotus* is included in Argentina (Olrog, 1959) and its distribution extended from Río Negro Province northward through arid habitats as far as Jujuy Province, where a specimen was collected at 3,600 m elevation in cold, arid puna habitat. The distribution of *H. montanus* does not extend into the forests of northwestern Argentina; its distribution includes the broad lowlands south of 28°S, especially in dry habitats. *H. magellanicus* is recognized as a full species rather than a subspecies of *H. montanus*. It is found in the cold mesic forests of Tierra del Fuego and westernmost Patagonia and is known from only three localities. *H. velatus* is restricted in Argentina to the provinces of Corrientes and Misiones, where it is known from only a few specimens.

We recognize the Genus *Dasypterus* as separate from *Lasiurus*. With respect to *Lasiurus*, its species present few taxonomic problems. Previously, most authors have considered *L. varius* to be a subspecies of *L. borealis*. Barquez (1987), Barquez et al. (1993), and Mares et al. (1995) have all listed *L. varius* as a separate species limited to southernmost Argentina. We review the morphological characteristics that lead to our recognition of it as a separate species. We have also elected to include *L. salinae* (Mares et al., 1995) in *L. blossevillii* as a color morph of *blossevillii*, especially given the genetic analysis of *L. blossevillii* by Morales and Bickham (1995). This has been a vexing taxon for a long time and warrants additional genetic research.

For the Family Molossidae, 8 genera and 18 species occur in Argentina. In this study, the Genus *Cynomops* is considered to be distinct from *Molossops*

(Thomas, 1920*a*), and *Tadarida* is considered to be distinct from *Nyctinomops* (Freeman, 1981*a*). Two species of *Molossops* are found in Argentina. *M. temminckii* is listed with only one subspecies, as no diagnostic characters could be found to maintain the validity of *M. t. sylvia*. However, the assignment of subspecies to Argentine populations is not possible without an analysis of specimens from other parts of South America. *M. neglectus* is included in the fauna of the country based on Barquez (1987), its presence underscoring the paucity of information on the mammals of South America. It was originally described from northern South America in 1980 (Williams and Genoways, 1980), but over time a few specimens have appeared from Peru, Brazil, and Argentina. Eventually, it is likely that this species will be found to be widely distributed in South America.

The Genus *Cynomops* is represented in Argentina by three species. *C. paranus* is included in the fauna of the country and is considered a full species, not a subspecies of *planirostris*; it is known only from a single specimen from the province of Corrientes. *C. planirostris*, which was first reported for Argentina in Salta Province by Olrog and Barquez (1979), is here extended to the neighboring province of Jujuy. The distribution of the third species, *C. abrasus*, includes the provinces of Santiago del Estero, Chaco, Formosa, and Misiones. The identities of the specimens of *Cynomops* cited by Cabrera (1930, 1958) from the provinces of Formosa and Chaco, and Yepes (1944) from Colonia Dora, Santiago del Estero Province, are uncertain.

The Genus *Tadarida* has only one species in Argentina, *T. brasiliensis*, one of the most widely distributed species in the country and, indeed, the world. In Argentina, it occupies almost all phytogeographic regions and was the most commonly collected species, with 502 specimens. We frequently found that specimens of *Eumops patagonicus* were misidentified as *T. brasiliensis* in collections and were then incorrectly reported in the literature. For example, *T. brasiliensis* is not known to occur in Chaco Province, as cited by Fornes and Massoia (1967) for specimens of *Eumops patagonicus*. Nevertheless, the presence of *T. brasiliensis* in Chaco Province is almost certain, the lack of specimens notwithstanding.

Numerous characters support the generic distinctness of *Nyctinomops* and *Tadarida* (Freeman, 1981*a*). Two species of *Nyctinomops* occur in Argentina: *N. macrotis* and *N. laticaudatus*. The latter was included in Argentina by Barquez and Ojeda (1975).

The largest number of molossid species in Argentina (six) is found in the Genus *Eumops: E. auripendulus*, *E. bonariensis*, *E. dabbenei*, *E. glaucinus*, *E. patagonicus*, and *E. perotis*. *E. auripendulus* occurs in the provinces of Chaco, Santa Fe, and Misiones. *E. bonariensis* is restricted to one subspecies in Argentina (*E. b. bonariensis*) and its distribution extends from the provinces of Buenos Aires and Entre Ríos to the province of Tucumán. In Tucumán it is found in sympatry with *E. patagonicus*, which we recognize as a distinct species. *E. bonariensis beckeri* is placed in synonymy with *E. patagonicus*. We have clarified the type locality of *E. dabbenei*. Although the exact location of the type locality of *E. dabbenei* was unknown, it had been reported as Chaco Province. The type specimen was sent to the BMNH by the MACN. Using the MACN archives, we were able to define the type locality of *E. dabbenei* as Tartagal, Departamento General Guemes, Chaco Province.

There are two species of bats in Argentina in the Genus *Promops*: *P. centralis* and *P. nasutus*. New distribution localities are reported for both. *P. centralis occultus* is maintained as a valid subspecies for the Argentine populations. No justification was found for the separation of *P. nasutus* into two subspecies.

The last genus of molossid represented in Argentina is *Molossus*, with two species: *M. ater* and *M. molossus*. Due to the lack of records of *M. ater* for some areas, a subspecific treatment of the species was not possible. *M. molossus crassicaudatus* is apparently the only subspecies of *M. molossus* occurring in Argentina.

Zoogeography.— If we consider that from the time of Cabrera (1958) to the present day the number of bat species known from Argentina increased by almost 40%, and that at least 13 additional species are likely to be found in the country, a detailed analysis of zoogeographic patterns must of necessity be considered preliminary. Only one species of bat, *Myotis aelleni*, is restricted to Argentina; it is rare (we examined no specimens) and its taxonomic validity is questionable. However, Argentina is a large nation composed of a complex array of habitats extending over 33 degrees of latitude, and some patterns of occurrence emerge among the bats of the country.

Table 25. Occurrence of bat species in each political province and territory of Argentina, the Malvinas (Falkland) Islands, and on a ship in the Atlantic Ocean. Provinces and localities are as follows: 1) Buenos Aires; 2) Catamarca; 3) Chaco; 4) Chubut; 5) Córdoba; 6) Corrientes; 7) Entre Ríos; 8) Formosa; 9) Jujuy; 10) La Pampa; 11) La Rioja; 12) Mendoza; 13) Misiones; 14) Neuquén; 15) Río Negro; 16) Salta; 17) San Juan; 18) San Luis; 19) Santa Cruz; 20) Santa Fé; 21) Santiago del Estero; 22) Tierra del Fuego; 23) Tucumán; 24) Atlantic Ocean; 25) Malvinas (Falklands).

	Provinces and Localities																								
Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Noctilio albiventris			x			x		x					x							x					
Noctilio leporinus			x			x		x	x				x			x				x	x				
Macrophyllum macrophyllum													x												
Tonatia bidens									x				x												
Chrotopterus auritus			x			x		x	x				x			x							x		
Glossophaga soricina	x		x						x				x			x									
Anoura caudifer									x							x									
Carollia perspicillata			x			x		x					x												
Sturnira erythromos		x							x							x							x		
Sturnira lilium		x	x			x	x	x	x				x		x	x				x			x		
Sturnira oporaphilim									x							x							x		
Platyrrhinus lineatus			x			x		x					x												
Vampyressa pusilla													x												
Artibeus fimbriatus			x					x					x												
Artibeus lituratus						x		x					x												
Artibeus planirostris								x	x							x							x		
Pygoderma bilabiatum						x							x			x									
Desmodus rotundus		x	x		x	x	x	x	x		x		x			x	x	x			x		x		
Diaemus youngi									x				x												
Myotis aelleni				x											x										
Myotis albescens	x		x			x	x	x					x			x					x		x		
Myotis chiloensis				x										x	x										
Myotis keaysi																x							x		
Myotis levis	x	x			x		x			x	x	x	x	x		x	x	x		x	x		x		
Myotis nigricans		x	x			x		x	x				x			x					x		x		
Myotis riparius			x			x		x					x			x					x		x		
Myotis ruber						x		x					x												
Myotis simus						x		x																	
Eptesicus brasiliensis			x			x																			
Eptesicus diminutus	x					x			x	x			x			x				x	x		x		
Eptesicus furinalis	x	x	x		x	x	x	x	x	x	x	x	x			x				x	x		x		

Table 25 (continued). Occurrence of bat species in each political province and territory of Argentina, the Malvinas (Falkland) Islands, and on a ship in the Atlantic Ocean. Provinces and localities are as follows: 1) Buenos Aires; 2) Catamarca; 3) Chaco; 4) Chubut; 5) Córdoba; 6) Corrientes; 7) Entre Ríos; 8) Formosa; 9) Jujuy; 10) La Pampa; 11) La Rioja; 12) Mendoza; 13) Misiones; 14) Neuquén; 15) Río Negro; 16) Salta; 17) San Juan; 18) San Luis; 19) Santa Cruz; 20) Santa Fé; 21) Santiago del Estero; 22) Tierra del Fuego; 23) Tucumán; 24) Atlantic Ocean; 25) Malvinas (Falklands).

	Provinces and Localities																								
Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Histiotus macrotus		x			x				x					x	x	x	x	x			x		x		
Histiotus magellanicus														x								x			
Histiotus montanus	x			x	x						x	x		x	x				x		x				
Histiotus velatus						x							x												
Daypterus ega	x	x			x	x		x	x	x			x			x				x	x		x	x	
Lasiurus blossevilii	x	x	x		x	x	x	x	x	x			x			x	x			x	x		x		
Lasiurus cinereus	x	x			x	x	x			x	x	x	x		x	x		x		x	x		x		
Lasiurus varius														x	x										
Molossops neglectus													x												
Molossops temminckii	x		x	x	x	x		x	x				x			x				x	x		x		
Cynomops abrasus			x					x					x								x				
Cynomops paranus						x																			
Cynomops planirostris									x							x									
Tadarida brasiliensis	x	x		x	x		x	x	x	x	x	x	x	x	x	x	x	x		x	x		x		x
Nyctinomops laticaudatus								x					x			x									
Nyctinomops macrotis		x							x		x					x							x		
Eumops auripendulus			x										x							x					
Eumops bonariensis	x				x		x													x			x		
Eumops dabbenei			x													x				x	x		x		
Eumops glaucinus									x		x		x			x							x		
Eumops patagonicus	x		x	x		x		x					x			x				x	x		x		
Eumops perotis			x		x	x		x	x		x					x					x		x		
Promops centralis								x																	
Promops nasutus		x	x		x			x	x				x			x					x		x		
Molossus ater			x		x	x		x	x				x			x				x					
Molossus molossus	x		x		x	x	x	x	x		x		x			x				x	x		x		
TOTAL	14	13	24	6	15	27	10	28	26	7	10	5	37	7	8	33	5	5	1	17	21	1	27	1	1

The seven political provinces that support the greatest number of bat species are Misiones (37), Salta (33), Formosa (28), Corrientes (27), Tucumán (27), Jujuy (26), and Chaco (24). Species occurrence by province is presented in Table 25. Misiones, Formosa, Chaco, and Corrientes are situated in the Northeast near the tropics. Complex wet forests and vast swamps characterize the area, and it is not surprising that a largely tropical taxon, such as bats, would be quite speciose in the region. Salta, Jujuy and Tucumán are in the Northwest, and a portion of two of the provinces lies within the tropics. Moist forest is found in all three provinces, and the number of bat species is correspondingly elevated. All seven provinces support other largely tropical species as well, such as primates, various marsupials, sloths, tapirs, jaguars, agoutis, and so forth.

Moving south in Argentina, tropical latitudes give way to temperate zones, and much of the country becomes semiarid thorn scrub, savanna, or desert scrub. As might be expected, bat diversity declines along with the precipitation, average annual temperature, and complexity of the habitat. Bat diversity also declines with increasing elevation in the Andes.

We compare the patterns of distribution of the bats of Argentina with the phytogeographic provinces of the country that were designated by Cabrera and Willink (1973), and with the faunal areas of South America (Koopman, 1982), as these pertain to Argentina. We have modified Cabrera and Willink's map based on our own field research (Fig. 162). The number of bat species in each phytogeographic province is given in Table 26. We have also calculated the index of faunistic congruence of Wallin (DeBlase, 1980) for the bat faunas of the major phytogeographic regions of Argentina. This index is obtained by:

$$I_{a,b} = \sqrt{P_{a \rightarrow b} \bullet P_{b \rightarrow a}}$$

where $I_{a,b}$ is the index of faunistic congruence between regions a and b; $P_{a \rightarrow b}$ is the percent of species in region a that also occur in region b; and $P_{b \rightarrow a}$ is the percent of species of region b that also occur in region a. The higher the index, the greater the similarity between the faunas of the two regions compared. The index for two regions with identical composition is 100. In Table 27, we provide a matrix of the index of faunistic congruence between the phytogeographic provinces, as well as the number of species of bats that are shared between each phytogeographic province (Table 27).

The Chaco is the richest phytogeographic province from the standpoint of its bats, with 44 species. In Koopman's zoogeographic scheme, the Argentine Chaco is part of the Patagonian subregion. Although he comments on a belt of scrubland that extends northward to the Brazilian Caatinga, he does not designate this region as a separate zone, including it within either the Amazon Basin or Eastern Brazilian highlands. Phytogeographically, the Chacoan thorn scrub in Argentina is a vast savanna-woodland that extends from the border with Paraguay and Bolivia southward to San Luis Province (Fig. 162). Among the species-rich political provinces it includes are Chaco, Formosa, Santiago del Estero, and portions of Corrientes, Salta and Tucumán (Table 23). Three species of bats are restricted to the Chaco: *Eptesicus brasiliensis, Cynomops paranus*, and *Promops centralis*. Thus, only about 7% of the fauna is restricted to the phytogeographic province, while the remaining species are shared with neighboring regions. The Chaco, at least in Argentina, cannot be considered a faunal region for bats, although it cannot be considered to be an extension of the Patagonian subregion either, with which it has an index of faunal congruence of only 15. If anything, the Chaco is an ecotonal, southern, semiarid extension of the two great tropical forests of western and eastern South America, having an index of faunal congruence of 78 with both the Yungas and the Paranean phytogeographic provinces (Table 27). At the same time, the Chaco abuts the Espinal and Monte phytogeographic provinces and is a northward, mesic (by comparison) extension of the drylands. As a consequence, it supports an especially rich fauna of mammals, with some elements from each adjoining province.

The second richest phytogeographic province in Argentina from the standpoint of bats is the Paranean, which includes the mesic tropical forests of the Northeast along the border with Brazil and Paraguay. It has a bat fauna of 38 species, of which four (*Macrophyllum macrophyllum, Vampyressa pusilla, Histiotus velatus, and Molossops neglectus*) are restricted to the province. Although this province is not large in Argentina, it is rich in species and includes the political province of Misiones; it abuts the Chaco, with which it has an index of faunal congruence of 78. The Paranean phytogeographic province corresponds closely with Koopman's Eastern Brazilian highlands faunal area.

Figure 162 (facing page). Phytogeographic regions of Argentina.

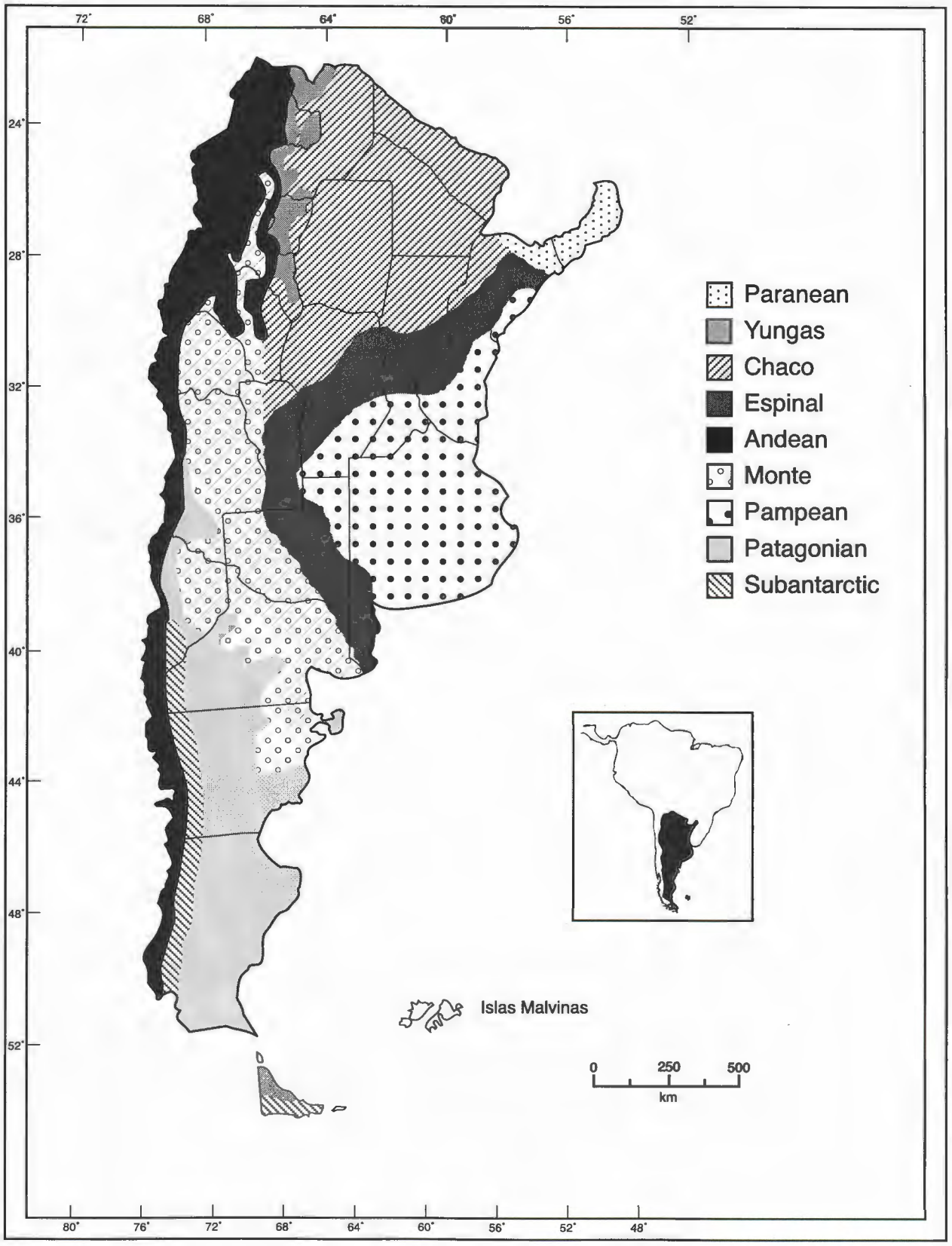

72°
68°
64°
60°
56°
52°
24°
28°
32°
36°
40°
44°
48°
52°
Paranean
Yungas
Chaco
Espinal
Andean
Monte
Pampean
Patagonian
Subantarctic
Islas Malvinas
0
250
500
km
80°
76°
72°
68°
64°
60°
56°
52°
48°

Table 26. Occurrence of bat species in the major phytogeographic provinces of Argentina.

	Phytogeographic Province								
Species	Chaco	Paranean	Yungas	Espinal	Monte	Pampean	Sub-Antarctic	Patagonian	Andean
Noctilio albiventris	x	x							
Noctilio leporinus	x	x	x	x					
Macrophyllum macrophyllum		x							
Tonatia bidens	x	x	x						
Chrotopterus auritus	x	x	x						
Glossophaga soricina	x	x	x			x			
Anoura caudifer			x						
Carollia perspicillata	x	x							
Sturnira erythromos	x		x						
Sturnira lilium	x	x	x	x	x	x			
Sturnira oporaphilum			x						
Vampyrops lineatus	x	x							
Vampyressa pusilla		x							
Artibeus fimbriatus	x	x							
Artibeus lituratus	x	x							
Artibeus planirostris	x		x						
Pygoderma bilabiatum		x	x						
Desmodus rotundus	x	x	x	x	x	x			
Diaemus youngii		x	x						
Myotis aelleni							x		
Myotis albescens	x	x	x			x			
Myotis chiloensis					x		x	x	
Myotis keaysi	x		x						
Myotis levis	x	x	x	x	x	x			x
Myotis nigricans	x	x	x		x				
Myotis riparius	x	x	x						
Myotis ruber	x	x							
Myotis simus	x	x							
Eptesicus brasiliensis	x								
Eptesicus diminutus	x	x	x	x		x			
Eptesicus furinalis	x	x	x	x	x	x			x
Histiotus macrotus	x		x	x	x		x		x
Histiotus montanus	x			x	x	x	x	x	
Histiotus magellanicus							x		
Histiotus velatus		x							

Table 26 (continued). Occurrence of bat species in the major phytogeographic provinces of Argentina.

	Phytogeographic Province								
Species	Chaco	Paranean	Yungas	Espinal	Monte	Pampean	Sub-Antarctic	Patagonian	Andean
Lasiurus blossevillii	x	x	x	x	x	x			
Lasiurus cinereus	x	x	x	x	x	x			
Lasiurus ega	x	x	x	x		x			
Lasiurus varius					x		x	x	
Molossops neglectus		x							
Molossops temminckii	x	x	x	x		x			
Cynomops abrasus	x	x							
Cynomops paranus	x								
Cynomops planirostris			x						
Tadarida brasiliensis	x	x	x	x	x	x	x	x	x
Nyctinomops laticaudatus	x	x	x						
Nyctinomops macrotis	x		x		x				
Eumops auripendulus	x	x		x					
Eumops bonariensis	x		x	x		x			
Eumops dabbenei	x		x	x					
Eumops glaucinus	x	x	x						
Eumops patagonicus	x	x	x		x	x			
Eumops perotis	x		x	x					
Promops centralis	x								
Promops nasutus	x	x	x		x				
Molossus ater	x	x	x	x					
Molossus molossus	x	x	x	x	x	x			
TOTAL	44	38	36	19	16	16	7	4	4

Table 27. Indices of faunal congruence of bats between major phytogeographic provinces of Argentina (above the diagonal) and number of species of bats shared between the major phytogeographic provinces (below the diagonal).

Phytogeographic Province	Yungas	Paranense	Andean	Chaco	Espinal	Monte	Pampean	Patagonian	Sub-Antarctic
Yungas		67.6	33.3	77.8	64.9	14.8	62.4	8.2	8.8
Paranense	25		24.3	78.2	52.0	44.5	56.7	8.1	6.1
Andean	4	3		30.2	45.8	50.0	37.4	25.0	37.7
Chaco	31	32	4		65.7	73.4	60.3	15.0	17.0
Espinal	17	14	19	19		53.7	74.5	22.9	21.2
Monte	13	11	14	14	10		62.5	50.0	47.2
Pampean	15	14	16	16	13	10		25.0	18.9
Patagonian	1	1	2	2	2	4	2		75.6
Sub-Antarctic	2	1	3	3	3	5	2	4	

Like the Chaco, this region in Argentina does not warrant designation as a separate faunal zone from the standpoint of its bats, although when all of its mammals are considered, many species are limited to this province.

The Yungas phytogeographic province, the third richest in terms of bats in Argentina, is the montane moist forest that is the southernmost extension of the Bolivian montane subtropical forest as far south as Catamarca Province (Ojeda and Mares, 1989). The Yungas, although the smallest phytogeographic province in Argentina, supports 36 species of bats (two of which, *Sturnira oporaphilum* and *Cynomops planirostris*, are restricted to the province), and includes portions of the species-rich political provinces of Salta, Jujuy, Tucumán, and Catamarca. The Yungas abuts the Chaco and has an index of faunal congruence of 78. In addition, the Yungas has an index of faunal congruence of 68 with the Paranean province. Indeed, these three phytogeographic provinces, when taken together, support 53 of Argentina's 57 species of bats, or 93% of the country's bat fauna. These regions thus form the southernmost extension of South America's tropical forest fauna into the temperate zone, the region where the tropical fauna reaches its southern limits, which occurs at about 30° south latitude.

This great decline in bat species is a result of the other phytogeographic provinces being generally colder, drier, and with a reduced vegetation complexity. The Espinal province supports 19 species, none of which is restricted to the province; the Monte and Pampean support 16 each (with no species restricted to them). The cold Subantarctic phytogeographic province, with only seven bats, is the only other area that, in Argentina, supports species that are restricted to that vegetational zone, and there are two, both vespertilionids: *Myotis aelleni* and *Histiotus magellanicus*. The Patagonian phytogeographic province and the high-elevation Andean province support only four bat species each. The Subantarctic and Patagonian share most of their fauna (index of faunal congruence of 76), whereas the Andean province only shares a small proportion of its fauna with the cold, lowland southern provinces (index of faunal congruence = 25 with the Patagonian, and 38 with the Subantarctic). The Subantarctic, Pampean, and Patagonian phytogeographic provinces all have their northern limits south of 30° south latitude, and these three provinces, together, support only 20 species of bats, roughly a third of the country's fauna.

Argentina's bat fauna is not sufficiently rich to delineate faunal regions, but it is more complex than has been suggested. Thus, Koopman's (1982) hypothesis of a massive, relatively homogeneous zoogeographic subregion, the Patagonian, that includes almost all of Argentina's bats, with an intrusion of the Eastern Brazilian highlands subregion into northeastern Argentina, is no longer tenable. Increased information on the distribution and systematics of Argentina's bats requires that this scheme be modified. The Chacoan element is pronounced, extending all the way into central Argentina and forming a great faunal ecotone between the tropical forests; it is distinctive from the Patagonian subregion.

The Eastern Brazilian highlands subregion reflects faunal and floral distinctiveness, although its bats are shared widely with other largely tropical phytogeographic provinces, especially the Chaco and the Boliv-

ian forest fauna (the Yungas). The latter is also shown to extend well southward into central Argentina, as distinct from Koopman's map (Koopman, 1982:fig. 1).

Willig and Mares (1989), in a statistical analysis of tropical bat distribution patterns in Venezuela, showed that bats do not reflect habitats with great fidelity. Bats are a subset of the mammal fauna, but a uniquely volant subset capable of dispersing or foraging over long distances or across habitats. They do not correlate in their patterns of occurrence with dominant aspects of the vegetation. Argentina's bats, while relatively rich in species, account for only about one-fifth of the country's mammal species. Thus, they might not be expected to reflect major habitat discontinuities, such as phytogeographic provinces, when the patterns of distribution of the bats are examined.

Argentina's bats are few in number, highly vagile, and quite sensitive to both low temperatures and aridity. Although there are hints of species groups adhering to limits defined for floral provinces (e.g., Yungas, Chaco, Paranean, Subantarctic), the few bat species showing these patterns are greatly outnumbered by eurytopic species that occur in a number of provinces. Thus, bats are not of great utility in delineating faunal regions, and the hints of patterns are pale reflections of more profound patterns that characterize the entire mammal fauna. Nevertheless, bats are unusual mammals from many points of view, and how they respond to biotic and abiotic environmental factors is an interesting question. As additional research on the distribution, ecology, and systematics of Argentina's bats takes place, more subtle (and more important) patterns based in the biology of the species will emerge.

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APPENDIX I

GAZETTEER

1. 6 km NE by Highway 2 of jct. Highway 2 and Arroyo Paraíso (Guaraní, Misiones) 27° 08' S 54° 00' W
2. 7 de Abril (Burruyacú, Tucumán) 26° 18' S 64° 29' W
3. Abra de Cañas, 1724 m (Valle Grande, Jujuy) 23° 40' S 64° 54' W
4. Abra de Cañas, 1730 m (Valle Grande, Jujuy) 23° 40' S 64° 54' W
5. Abra de Cañas, app. 30 km NW Calilegua, sobre ruta a Valle Grande (Valle Grande, Jujuy) 23° 40' S 64° 54' W
6. Abra de Cañas, El Monolito, 1700 m (Valle Grande, Jujuy) 23° 40' S 64° 54' W
7. Abra Grande (Orán, Salta) 23° 05' S 64° 22' W
8. Abra Grande, 10 km N Orán (Orán, Salta) 23° 05' S 64° 22' W
9. Abra Grande, 20 km NW Orán (Orán, Salta) 23° 04' S 64° 30' W
10. Acheral (Monteros, Tucumán) 27° 07' S 65° 27' W
11. Agua Blanca (Orán, Salta) 22° 45' S 64° 22' W
12. Agua Blanca, 20 km NW (Orán Salta) 22° 33' S 64° 32' W
13. Agua Blanca, 24 km NW (Orán, Salta) 22° 33' S 64° 32' W
14. Agua Blanca, 25 km NW (Orán, Salta) 22° 33' S 64° 32' W
15. Agua Blanca, 5 km W (Orán, Salta) 22° 45' S 64° 25' W
16. Agua Colorada (Burruyacú, Tucumán) 26° 26' S 64° 53' W
17. Agua de Ramón (Minas, Córdoba) 30° 48' S 65° 22' W
18. Agua de Torres (Chical-Có, La Pampa) 36° 10' S 68° 09' W
19. Agua Rosada (Trancas, Tucumán) 26° 22' S 65° 26' W
20. Agua Rosada, San Pedro de Colalao (Trancas, Tucumán) 26° 22' S 65° 26' W
21. Agua Salada, app. 15 km SE Agua Caliente, lado oriental del Río San Francisco (Santa Bárbara, Jujuy) 23° 57' S 64° 38' W
22. Aguaray (San Martín, Salta) 22° 16' S 63° 46' W
23. Aguaray, 700 m (San Martín, Salta) 22° 16' S 63° 46' W
24. Aguas Blancas (Orán, Salta) 22° 45' S 64° 22' W
25. Aguas Blancas, 14 km E Santa Clara (Santa Bárbara, Jujuy) 24° 18' S 64° 28' W
26. Aguas Blancas, 27 km W (Iruya, Salta) 22° 45' S 64° 45' W
27. Aguas Chiquitas (Burruyacú, Tucumán) 26° 37' S 65° 12' W
28. Aguas Chiquitas, 25 km NE San Miguel de Tucumán, 800 m (Burruyacú, Tucumán) 26° 37' S 65° 12' W
29. Aguas Chiquitas, El Cadillal (Burruyacú, Tucumán) 26° 37' S 65° 12' W
30. Aguas Chiquitas, Sierras de Medina, 800 m (Burruyacú, Tucumán) 26° 37' S 65° 12' W
31. Aguas Negras, Parque Nacional Calilegua (Ledesma, Jujuy) 23° 45' S 64° 56' W
32. Aimogasta (Arauco, La Rioja) 28° 33' S 66° 49' W
33. Alejandra (San Javier, Santa Fe) 29° 58' S 59° 50' W
34. Algarrobal, 20 km E General Güemes (General Güemes, Salta) 24° 32' S 64° 53' W
35. Almafuerte, (Leandro N. Alem, Misiones) 27° 30' S 55° 24' W
36. Alta Gracia (Santa María, Córdoba) 31° 40' S 64° 26' W
37. Alto Macueta, 2 km N del cruce de Macueta y Campo Lago (San Martín, Salta) 22° 02' S 63° 59' W
38. Amaicha del Valle, 2000 m (Tafí del Valle, Tucumán) 26° 36' S 65° 55' W
39. Añatuya (Sobremonte, Santiago del Estero) 28° 27' S 62° 50' W
40. Andalgalá (Andalgalá, Catamarca) 27° 36' S 66° 20' W
41. Andalgalá, 13 km N (Andalgalá, Catamarca) 27° 32' S 66° 20' W
42. Andalgalá, 4 km S (Andalgalá, Catamarca) 27° 32' S 66° 20' W
43. Angosto del Pescado, Serranía de Las Pavas

(Orán, Salta) 22° 33' S 64° 32' W
44. Angosto El Duraznal, 15 km S Palma Sola, 1225 m (Santa Bárbara, Jujuy) 24° 10' S 64° 20' W
45. Anisacate (Santa María, Córdoba) 31° 43' S 64° 25' W
46. Anta Mapú (Burruyacú, Tucumán) 26° 31' S 64° 43' W
47. Antilla (Rosario de La Frontera, Salta) 26° 7' S 64° 36' W
48. Antinaco, 1130 m (Famatina, La Rioja) 28° 49' S 67° 19' W
49. Apolinario Saravia, 5 km W (Anta, Salta) 24° 30' S 64° 10' W
50. Apóstoles (Apóstoles, Misiones) 27° 54' S 55° 45' W
51. Arenales, 15 km E Piedrabuena (Jiménez, Santiago del Estero) 26° 43' S 64° 35' W
52. Aristóbulo del Valle, 10 km W by road along Río Cuñapirú (Cainguás, Misiones) 27° 06' S 54° 57' W
53. Arroyo Aguas Chiquitas, Reserva Provincial Aguas Chiquitas (Burruyacú, Tucumçn) 26° 37' S 65° 12' W
54. Arroyo de Las Cañas, Horco Molle (Yerba Buena, Tucumán) 26° 45' S 65° 23' W
55. Arroyo El Saltón, Reserva Provincial Santa Ana (Río Chico, Tucumán) 27° 26' S 65° 46' W
56. Arroyo La Higuera (San Javier, Córdoba) 32° 11' S 65° 13' W
57. Arroyo La Urbana, 45 km E y 5.4 km SE San Salvador de Jujuy, 620 m (San Pedro, Jujuy) 24° 20' S 64° 50' W
58. Arroyo Los Noques, Parque Nacional El Rey (Anta, Salta) 24° 32' S 64° 38' W
59. Arroyo Sauzalito, Parque Nacional Calilegua (Ledesma, Jujuy) 23° 40' S 64° 42' W
60. Arroyo Yabebyri, entre Loreto y el Arroyo Yabebyri, sobre ruta 12 (Candelaria, Misiones) 27° 15' S 55° 32' W
61. Arroyo Yuto, 13 km SW Yuto (Ledesma, Jujuy) 23° 38' S 64° 28' W
62. Arroyo Zaimán (Capital, Misiones) 27° 22' S 55° 53' W
63. Astica (Valle Fertil, San Juan) 30° 54' S 67° 13' W
64. Azul (Azul, Buenos Aires) 36° 47' S 59° 51' W
65. Bahía Blanca (Bahía Blanca, Buenos Aires) 38° 44' S 62° 16' W
66. Baigorria (Río Cuarto, Córdoba) 32° 50' S 64° 20' W
67. Balcarce (Balcarce, Buenos Aires) 37° 48' S 57° 51' W
68. Balneario El Caolín, 6 km NW Chumbicha (Capayán, Catamarca) 28° 52' S 66° 14' W
69. Balneario Municipal Capayán, Chumbicha (Capayán, Catamarca) 28° 52' S 66° 14' W
70. Bañado de Figueroa, Río Salado (Figueroa, Santiago del Estero) 27° 7' S 63° 41' W
71. Bandfield (Lomas de Zamora, Buenos Aires) 34° 45' S 58° 24' W
72. Bariloche (Bariloche, Río Negro) 41° 08' S 71° 23' W
73. Bariloche, 20 km E (Pilcaniyeu, Río Negro) 41° 08' S 71° 08' W
74. Bariloche, 3 km W (Bariloche, Río Negro) 41° 08' S 71° 23' W
75. Bariloche, 4 km W (Bariloche, Río Negro) 41° 08' S 71° 23' W
76. Barranqueras (San Fernando, Chaco) 27° 29' S 58° 56' W
77. Bartolomé de Las Casas (Patiño, Formosa) 25° 20' S 59° 41' W
78. Beatriz, Nahuel Huapi, 800 m (Los Lagos, Neuquén) 40° 51' S 71° 39' W
79. Belgrano (Distrito Federal, Buenos Aires) 34° 34' S 58° 28' W
80. Bella Vista (General Sarmiento, Buenos Aires) 34° 34' S 58° 42' W
81. Benjamín Paz (Trancas, Tucumán) 26° 23' S 65° 18' W
82. Bernal (Quilmes, Buenos Aires) 34° 42' S 58° 14' W
83. Betania (General Güemes, Salta) 24° 32' S 65° 7' W
84. Bialet Massé (Punilla, Córdoba) 31° 18' S 64° 28' W
85. Biological Reserve at Horco Molle (Yerba Buena, Tucumán) 26° 45' S 65° 21' W
86. Biological Reserve at Horco Molle, near residencia, 2,400 ft. (Yerba Buena, Tucumán) 26° 45' S 65° 21' W
87. Bonifacio, F. C. Sud (Guaminí, Buenos Aires) 36° 49' S 62° 13' W
88. Bonpland (Candelaria, Misiones) 27° 29' S 55° 29' W
89. Bosch, 15 km NW Balcarce (Balcarce, Buenos Aires) 37° 38' S 58° 14' W
90. Bouvier (Pilcomayo, Formosa) 25° 27' S 57° 35' W
91. Bouvier, Clorinda (Pilcomayo, Formosa) 25° 27'

S 57° 35' W
92. Brazo Largo (Islas del Ibicuy, Entre Ríos) 33° 51' S 58° 57' W
93. Buenos Aires (Distrito Federal, Buenos Aires) 34° 38' S 58° 34' W
94. Burruyacú (Burruyacú, Tucumán) 26° 30' S 64° 45' W
95. Burruyacú, Iglesia (Burruyacú, Tucumán) 26° 30' S 64° 45' W
96. Burzaco (Almirante Brown, Buenos Aires) 34° 50' S 58° 24' W
97. Cacheuta (Luján, Mendoza) 33° 01' S 69° 08' W
98. Cachi (Cachi , Salta) 25° 07' S 66° 12' W
99. Cachi, 2500 m (Cachi , Salta) 25° 07' S 66° 12' W
100. Cafayate (Cafayate, Salta) 26° 06' S 65° 57' W
101. Cafayate, 20 km NW, 1700 m (San Carlos, Salta) 25° 54' S 66° 09' W
102. Caimancito (Ledesma, Jujuy) 23° 44' S 64° 36' W
103. Caleu Caleu (Caleu Caleu, La Pampa) 38° 59' S 64° 04' W
104. Calilegua (Ledesma, Jujuy) 23° 46' S 64° 47' W
105. Cama Cortada, cerca de Los Hoyos (Río Seco, Córdoba) 29° 52' S 63° 39' W
106. Camino de Cornisa, 10 km W Dique La Ciénaga (El Carmen, Jujuy) 24° 29' S 65° 22' W
107. Campana (Campana, Buenos Aires) 34° 10' S 58° 57' W
108. Campana, INTA (Campana, Buenos Aires) 34° 10' S 58° 57' W
109. Campo Alegre (Juan F. Ibarra, Santiago del Estero) 28° 19' S 61° 54' W
110. Campo Gallo (Alberdi, Santiago del Estero) 26° 36' S 62° 50' W
111. Campo Quijano (Rosario de Lerma, Salta) 24° 54' S 65° 38' W
112. Campo Ramón (Oberá, Misiones) 27° 26' S 54° 58' W
113. Campo Santo (General Güemes, Salta) 24° 32' S 65° 06' W
114. Campo Santo, Escuela Nacional 149 (General Güemes, Salta) 24° 32' S 65° 06' W
115. Campo Viera (Oberá, Misiones) 27° 20' S 55° 03' W
116. Canal 15 (Castelli, Buenos Aires) 35° 58' S 57° 47' W
117. Canal 6, Delta bonaerense (Campana, Buenos Aires) 34° 7' S 59° 02' W
118. Candelaria (Candelaria, Misiones) 27° 28' S 55° 45' W
119. Capital Federal (Distrito Federal, Buenos Aires) 34° 38' S 58° 34' W
120. Capitán Solari, La Forestal (Sargento Cabral, Chaco) 26° 45' S 59° 49' W
121. Caraguatay (Montecarlo, Misiones) 26° 37' S 54° 37' W
122. Carro Quemado (Loventué, La Pampa) 36° 28' S 65° 21' W
123. Casa de Piedra, Río Los Sosa, ruta 307, km 24.9, 850 m (Monteros, Tucumán) 27° 03' S 65° 37' W
124. Caspichango (Monteros, Tucumán) 27° 04' S 65° 30' W
125. Castaño Nuevo, 9 km NW Villa Nueva (Calingasta, San Juan) 31° 02' S 69° 33' W
126. Catamarca, ciudad (Capital, Catamarca) 28° 28' S 65° 47' W
127. Cataratas del Iguazú (Iguazú, Misiones) 25° 41' S 54° 27' W
128. Cataratas del Iguazú, 125 m (Iguazú, Misiones) 25° 41' S 54° 27' W
129. Cebilar, 20 km W Apolinario Saravia (Anta, Salta) 24° 33' S 64° 30' W
130. Cercanías de San Pedro (San Pedro, Jujuy) 24° 15' S 64° 50' W
131. Cerrillos (Cerrillos, Salta) 24° 55' S 65° 29' W
132. Cerro de la Gloria (Capital, Mendoza) 32° 54' S 68° 50' W
133. Cerro del Campo, 900 m (Burruyacú, Tucumán) 26° 35' S 64° 57' W
134. Cerro San Javier (Yerba Buena, Tucumán) 26° 47' S 65° 24' W
135. Chañar Pozo (Río Hondo, Santiago del Estero) 27° 34' S 64° 41' W
136. Chancaní (Pocho, Córdoba) 31° 25' S 65° 28' W
137. Chascomús (Chascomús, Buenos Aires) 35° 34' S 58° 2' W
138. Chavarría (San Roque, Corrientes) 28° 57' S 58° 34' W
139. Chilecito (Chilecito, La Rioja) 29° 10' S 67° 30' W
140. Chimpay (Avellaneda, Río Negro) 39° 09' S 66° 11' W
141. Chos Malal (Chos Malal, Neuquén) 37° 23' S 70° 16' W
142. Choya, 13 km NNW of Andalgalá, 4,000 ft. (Andalgalá, Catamarca) 27° 32' S 66° 24' W
143. Chumbicha, 1 km N and W of balneario by road, 2,600 ft. (Capayán, Catamarca) 28° 52' S 66° 14' W
144. Chumbicha, 7 km N (Capayán, Catamarca) 28° 52' S 66° 14' W

145. Chumbicha, at balneario, 2,400 ft. (Capayán, Catamarca) 28° 52' S 66° 14' W
146. Ciudad Capital (Capital, Tucumán) 26° 50' S 65° 13' W
147. Clorinda (Pilcomayo, Formosa) 25° 17' S 57° 43' W
148. Clorinda, 13 km al S, sobre ruta 11 (Pilcomayo, Formosa) 25° 23' S 57° 47' W
149. Codihué (Picuches, Neuquén) 38° 28' S 70° 30' W
150. Colalao del Valle, 2500 m (Tafí del Valle, Tucumán) 26° 22' S 65° 57' W
151. Colastiné Sur (La Capital, Santa Fe) 31° 42' S 60° 40' W
152. Colonia Benítez (Primero de Mayo, Chaco) 27° 20' S 58° 57' W
153. Colonia Benítez, 20 km N Resistencia, 30 m (Primero de Mayo, Chaco) 27° 20' S 58° 57' W
154. Colonia Dora (Avellaneda, Santiago del Estero) 28° 37' S 62° 57' W
155. Colonia El Pavao, 41 km N Comandante Fontana on Rd 95 (Patiño, Formosa) 24° 55' S 59° 36' W
156. Colonia km 503 (Patiño, Formosa) 25° 23' S 60° 19' W
157. Colonia km 503, 16 km S (Patiño, Formosa) 25° 26' S 60° 15' W
158. Colonia Mártires (Candelaria, Misiones) 27° 26' S 55° 23' W
159. Colonia Mártires, Chacra Ferreira, 125 m (Candelaria, Misiones) 27° 26' S 55° 23' W
160. Colonia Mártires, Puerto Candelaria (Candelaria, Misiones) 27° 26' S 55° 23' W
161. Comandante Fontana (Patiño, Formosa) 25° 19' S 59° 30' W
162. Complejo Astronómico El Leoncito, 7 km W (Calingasta, San Juan) 31° 48' S 69° 20' W
163. Concepción (Chicligasta, Tucumán) 27° 20' S 65° 35' W
164. Concordia, 32 km N (Federación, Entre Ríos) 31° 09' S 57° 58' W
165. Corazón de María (Colón, Córdoba) 31° 30' S 64° 00' W
166. Córdoba (Capital, Córdoba) 31° 25' S 64° 12' W
167. Coronel J. F. Gómez (General Roca, Río Negro) 39° 03' S 67° 37' W
168. Coronel Vidal (Mar Chiquita, Buenos Aires) 37° 48' S 57° 44' W
168a. Corral de Piedras (Collón Curá, Neuquén) 40° 26' S 70° 36' W
169. Corrientes (Capital, Corrientes) 27° 28' S 58° 50' W
170. Corrientes Capital, Barrio Lomas (Capital, Corrientes) 27° 28' S 58° 50' W
171. Corrientes Capital, Escuela 599 (Capital, Corrientes) 27° 28' S 58° 50' W
172. Cruz del Eje (Cruz del Eje, Córdoba) 30° 44' S 64° 49' W
173. Cucho, San Salvador de Jujuy (Dr. Manuel Belgrano, Jujuy) 24° 04' S 65° 15' W
174. Cuesta del 25, 3 km N entrada al Dique El Cadillal (Tafí Viejo, Tucumán) 26° 37' S 65° 12' W
175. Cuesta del Clavillo, 3 km SW La Banderita (Andalgalá, Catamarca) 27° 29' S 66° 06' W
176. Cuesta del Clavillo, 5 km S La Banderita (Andalgalá, Catamarca) 27° 29' S 66° 06' W
177. Cuesta del Totoral (Paclín, Catamarca) 28° 01' S 65° 35' W
178. Cuesta La Sebila, Hwy 60 (Capayán, Catamarca) 28° 43' S 66° 22' W
179. Cueva del Chacho, Patquía (Independencia, La Rioja) 30° 03' S 66° 53' W
180. Cueva del Indio, 4 km W Cafayate, 1800 m (Cafayate, Salta) 26° 05' S 65° 58' W
181. Cueva del Murcielagallo, 15 km SSW Santa Victoria, 2000 m (Santa Victoria, Salta) 22° 15' S 65° 02' W
182. Cueva del Tigre, 74 km N Pampa Blanca, 700 m (Ledesma, Jujuy) 23° 57' S 64° 47' W
183. Cueva del Tigre, El Milagro (El Carmen, Jujuy) 24° 22' S 65° 02' W
184. Cueva María Antonia (San Ignacio, Misiones) 27° 17' S 55° 32' W
185. Cura Brochero (San Alberto, Córdoba) 31° 40' S 65° 00' W
186. Desaguadero, Escuela 208, Ruta Provincial 5, a 20 km de Corrientes (Capital, Corrientes) 27° 34' S 58° 39' W
187. Dique El Cadillal, 25 km N San Miguel de Tucumán (Tafí Viejo, Tucumán) 26° 37' S 65° 12' W
188. Dique El Potrero (Andalgalá, Catamarca) 27° 32' S 66° 20' W
189. Dique El Potrero, 13 km N Andalgalá (Andalgalá, Catamarca) 27° 32' S 66° 20' W
190. Dique Escaba (Alberdi, Tucumán) 27° 40' S 65° 46' W
191. Dique Itiyuro (San Martín, Salta) 22° 10' S 63° 50' W
192. Dique Itiyuro, 5 km W (San Martín, Salta) 22° 10' S 63° 55' W

193. Dique La Ciénaga (El Carmen, Jujuy) 24° 25' S 65° 17' W
194. Dique La Ciénaga, 13 km SSW S. S. de Jujuy (El Carmen, Jujuy) 24° 25' S 65° 17' W
195. Dique La Ciénaga, casa del club náutico, 30 km SSW San Salvador de Jujuy, 1000 m (El Carmen, Jujuy) 24° 25' S 65° 17' W
196. Dique Las Maderas (El Carmen, Jujuy) 24° 27' S 65° 15' W
197. Dique Las Maderas, 42 km San Salvador de Jujuy, 920 m (El Carmen, Jujuy) 24° 27' S 65° 15' W
198. Dique San Ignacio (La Cocha, Tucumán) 27° 44' S 65° 40' W
199. Dolavon (Gaimán, Chubut) 43° 20' S 65° 43' W
200. Dos de Mayo (Cainguás, Misiones) 27° 02' S 54° 39' W
201. Dos de Mayo, Paraje km 51 (Cainguás, Misiones) 27° 02' S 54° 39' W
202. Dragones (San Martín, Salta) 23° 16' S 63° 21' W
203. El Barreal (Capital, La Rioja) 29° 38' S 66° 02' W
204. El Bolsón (Bariloche, Río Negro) 41° 58' S 71° 31' W
205. El Bolsón, 3 km N (Bariloche, Río Negro) 41° 58' S 71° 31' W
206. El Breal (Rivadavia, Salta) 22° 14' S 62° 56' W
207. El Breal, 6 km SW Santa Victoria Este (Rivadavia, Salta) 22° 14' S 62° 56' W
208. El Cadillal (Tafí Viejo, Tucumán) 26° 37' S 65° 12' W
209. El Cadillal, 25 km N San Miguel de Tucumán (Tafí Viejo, Tucumán) 26° 37' S 65° 12' W
210. El Cadillal, Estación de Piscicultura (Tafí Viejo, Tucumán) 26° 37' S 65° 12' W
211. El Cadillal, Río Loro (Burruyacú, Tucumán) 26° 37' S 65° 10' W
212. El Cadillal, usina (Tafí Viejo, Tucumán) 26° 37' S 65° 12' W
213. El Carmen (El Carmen, Jujuy) 24° 24' S 65° 15' W
214. El Carrizal, Córdoba Range, 1000 m (San Javier, Córdoba) 31° 57' S 65° 12' W
215. El Carrizal, Villa Dolores, 1000 m (San Javier, Córdoba) 31° 57' S 65° 12' W
216. El Chaguaral (Orán, Salta) 24° 00' S 64° 00' W
217. El Challao (Las Heras, Mendoza) 32° 50' S 68° 52' W
218. El Churcal, approx. 10 km SSE Buena Vista (Bermejo, Formosa) 23° 30' S 61° 33' W
219. El Cogoik, 5 km antes de (Patiño, Formosa) 24° 48' S 59° 10' W
220. El Colmenar (Capital, Tucumán) 26° 50' S 65° 13' W
221. El Colorado (Pirané, Formosa) 26° 18' S 59° 22' W
222. El Cóndor, Lago Perito Moreno, 800 m (Bariloche, Río Negro) 41° 08' S 71° 26' W
223. El Corte (Yerba Buena, Tucumán) 26° 49' S 65° 26' W
224. El Duraznillo, 3000 m, Cerro Calilegua (Valle Grande, Jujuy) 23° 28' S 64° 55' W
225. El Hoyo (Cushamén, Chubut) 42° 03' S 71° 31' W
226. El Maitén, 2 km N (Cushamén, Chubut) 42° 02' S 71° 09' W
227. El Manantial (Lules, Tucumán) 26° 51' S 65° 17' W
228. El Mangrullo, 20 km NNW by road and 11 km NE by road (Almirante Brown, Chaco) 26° 09' S 61° 15' W
229. El Mojón (Pellegrini, Santiago del Estero) 26° 09' S 64° 18' W
230. El Monolito (Valle Grande, Jujuy) 23° 40' S 64° 54' W
231. El Naranjal (Monteros, Tucumán) 27° 02' S 65° 41' W
232. El Naranjo (Burruyacú, Tucumán) 26° 40' S 65° 03' W
233. El Nogalar, Ruta 307, 1700 m (Monteros, Tucumán) 27° 01' S 65° 40' W
234. El Palmar del Río San Francisco (Santa Bárbara, Jujuy) 24° 08' S 64° 33' W
235. El Paraíso (Yerba Buena, Tucumán) 26° 49' S 65° 26' W
236. El Porvenir (Metán, Salta) 25° 23' S 64° 55' W
237. El Potrero (Rosario de La Frontera, Salta) 25° 58' S 64° 40' W
238. El Potrero, 13 km N Andalgalá (Andalgalá, Catamarca) 27° 33' S 66° 20' W
239. El Retiro (Jiménez, Santiago del Estero) 27° 04' S 64° 28' W
240. El Rincón (Jiménez, Santiago del Estero) 26° 43' S 64° 40' W
241. El Rodeo, 900 m (Ambato, Catamarca) 28° 13' S 65° 52' W
242. El Rodeo-La Junta (Ambato, Catamarca) 28° 13' S 65° 52' W
243. El Simbolar, 25 km SW Palma Sola (Santa Bárbara, Jujuy) 24° 11' S 64° 28' W
244. El Tuscal (Tulumba, Córdoba) 29° 40' S 64° 31' W
245. El Zapallar, Finca Las Tres Marías (General Güemes, Salta) 24° 31' S 65° 00' W

246. Eldorado (Eldorado, Misiones) 26° 26' S 54° 41' W
247. Eldorado, 3 km SE (Eldorado, Misiones) 26° 26' S 54° 41' W
248. Embarcación, Finca Tres Pozos, 247 km NE San Salvador de Jujuy (San Martín, Salta) 23° 13' S 64° 07' W
249. Energía (San Cayetano, Buenos Aires) 38° 34' S 59° 21' W
250. Escuela 149, 30 km NE Salta (General Güemes, Salta) 24° 32' S 65° 06' W
251. Escuela Gurruchaga, Rosario de Lerma (Rosario de Lerma, Salta) 24° 59' S 65° 35' W
252. Escuela Provincial 639, Campo Ramón (Oberá, Misiones) 27° 26' S 54° 58' W
253. Esperanza (Las Colonias, Santa Fe) 31° 27' S 60° 56' W
254. Espinillo (Río Cuarto, Córdoba) 33° 01' S 64° 21' W
255. Estación Baños (Rosario de La Frontera, Salta) 25° 50' S 64° 50' W
256. Estación Médanos (Gualeguaychú, Entre Ríos) 33° 25' S 59° 41' W
257. Estación Paranacito (Islas del Ibicuy, Entre Ríos) 33° 42' S 59° 01' W
258. Estación Patquía, Guayapa (Independencia, La Rioja) 30° 09' S 66° 57' W
259. Estancia Alicura (Lácar, Neuquén) 40° 30' S 70° 45' W
260. Estancia Alto Las Juntas (Ambato, Catamarca) 28° 08' S 65° 54' W
261. Estancia El Casalito, Ruta 226 ca. km 98 (Balcarce, Buenos Aires) 37° 46' S 58° 00' W
262. Estancia El Cavao (Burruyacú, Tucumán) 26° 30' S 64° 45' W
263. Estancia La Esperanza (General Lavalle, Buenos Aires) 36° 30' S 57° 13' W
264. Estancia Las Juntas (Ambato, Catamarca) 28° 08' S 65° 54' W
265. Estancia Las Mercedes (Pilcomayo, Formosa) 25° 11' S 57° 54' W
266. Estancia Puesto Valle, 25 km E Ituzaingó (Ituzaingó, Corrientes) 27° 36' S 56° 25' W
267. Estancia San Miguel, along Hwy 90, 15 km NW jct. Hwy 90 and Hwy 11 (Primero de Mayo, Chaco) 26° 57' S 58° 59' W
268. Estancia Santa Catalina, 5 km S, km 64 (Patiño, Formosa) 24° 56' S 59° 12' W
269. Estancia Viamonte (Río Grande, Tierra del Fuego) 53° 59' S 67° 30' W
270. Estanislao del Campo (Patiño, Formosa) 25° 03' S 60° 06' W
271. Estanislao del Campo, 40 km N (Patiño, Formosa) 24° 43' S 60° 06' W
272. Ezpeleta (Quilmes, Buenos Aires) 34° 45' S 58° 14' W
273. Finca Abra Grande (San Martín, Salta) 22° 40' S 63° 41' W
274. Finca Belgrano, Cerrillos, 30 km SW Salta (Cerrillos, Salta) 24° 55' S 65° 29' W
275. Finca Catamontaña, 33 km SSE San Salvador de Jujuy, 925 m (El Carmen, Jujuy) 24° 23' S 65° 07' W
276. Finca El Arrazayal, Serranía de las Pavas (Orán, Salta) 22° 33' S 64° 32' W
277. Finca El Olvido, 15 km E Palma Sola (Santa Bárbara, Jujuy) 24° 00' S 64° 10' W
278. Finca El Pongo, 45 km E San Salvador de Jujuy (El Carmen, Jujuy) 24° 21' S 65° 04' W
279. Finca El Remate, 24 km SE San Salvador de Jujuy, 740 m (Dr. Manuel Belgrano, Jujuy) 24° 17' S 65° 06' W
280. Finca La Carolina, Los Perales, San Salvador de Jujuy, 1310 m (Dr. Manuel Belgrano, Jujuy) 24° 11' S 65° 19' W
281. Finca La Cruz, 28 km SSE Salta (Capital, Salta) 24° 54' S 65° 10' W
282. Finca La Cruz (Capital, Salta) 24° 54' S 65° 10' W
283. Finca La Florida, Rosario de Lerma, 25 km SSW Salta (Chicoana, Salta) 25° 01' S 65° 34' W
284. Finca La Rosa, Cafayate, 2000 m (Cafayate, Salta) 26° 06' S 65° 57' W
285. Finca La Toma, 25 km SW San Salvador de Jujuy (San Antonio, Jujuy) 24° 20' S 65° 21' W
286. Finca San Lorenzo, Rosario de La Frontera (Rosario de La Frontera, Salta) 25° 48' S 64° 58' W
287. Finca Santa Cruz, 3 km N Las Mercedes (Rosario de La Frontera, Salta) 25° 57' S 64° 40' W
288. Finca Tabaquillo, 15 km E Cruz del Eje (Cruz del Eje, Córdoba) 30° 45' S 64° 52' W
289. Florencia (General Obligado, Santa Fe) 28° 02' S 59° 14' W
290. Floresta (Distrito Federal, Buenos Aires) 34° 38' S 58° 28' W
291. Fracán (Guaraní, Misiones) 26° 47' S 54° 15' W
292. Fraile Pintado, 12 km W, sobre Río Ledesma (Ledesma, Jujuy) 23° 57' S 64° 55' W
293. Frontera, Tobuna (San Pedro, Misiones) 26° 26' S 53° 54' W

294. Gaspar Campos, 10 km N (General Alvear, Mendoza) 34° 39' S 67° 26' W
295. General Güemes, Ruta 34 km 1363 (General Güemes, Salta) 24° 31' S 65° 02' W
296. General Lavalle, 20 mi S (General Lavalle, Buenos Aires) 36° 42' S 56° 57' W
297. General M. M. de Güemes, 30 km SSW (General Güemes, Salta) 24° 40' S 65° 15' W
298. General Pico (Mara Có, La Pampa) 35° 40' S 63° 46' W
299. General Roca (General Roca, Río Negro) 39° 02' S 67° 33' W
300. General Vedia (Bermejo, Chaco) 26° 56' S 58° 41' W
301. Girardet (Moreno, Santiago del Estero) 27° 38' S 62° 11' W
302. Gobernador Lanusse (Iguazú, Misiones) 25° 58' S 54° 17' W
303. Gobernador Piedrabuena (Burruyacú, Tucumán) 26° 45' S 64° 40' W
304. Godoy Cruz (Godoy Cruz, Mendoza) 32° 55' S 68° 52' W
305. Goya (Goya, Corrientes) 29° 08' S 59° 17' W
306. Goya, 600 m (Goya, Corrientes) 29° 08' S 59° 17' W
307. Granja 17 de Abril (Marcos Paz, Buenos Aires) 34° 45' S 58° 58' W
308. Guachipas (Guachipas, Salta) 25° 31' S 65° 31' W
309. Guachipas, Iglesia (Guachipas, Salta) 25° 31' S 65° 31' W
310. Gualeguaychú (Gualeguaychú, Entre Ríos) 33° 01' S 58° 31' W
311. Guaraní (Oberá, Misiones) 27° 37' S 55° 10' W
312. Güemes (General Güemes, Salta) 24° 31' S 65° 02' W
313. Herrera (Avellaneda, Santiago del Estero) 28° 28' S 63° 04' W
314. Hickman (San Martín, Salta) 23° 13' S 63° 34' W
315. Hickman, Luna Muerta (San Martín, Salta) 23° 13' S 63° 34' W
316. Horco Molle (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
317. Horco Molle, 15 km W San Miguel de Tucumán (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
318. Horco Molle, 900 m (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
319. Horco Molle, Biological Reserve (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
320. Horco Molle, Parque Biológico Sierra de San Javier (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
321. Horco Molle, Residencia Universitaria (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
322. Horco Molle, Río Las Cañas (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
323. Horco Molle, Río Las Leñas (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
324. Horco Molle, Río Las Piedras (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
325. Horcones (Rosario de La Frontera, Salta) 25° 48' S 64° 55' W
326. Hotel Llao Llao (Bariloche, Río Negro) 41° 01' S 71° 31' W
327. Hotel Termas, Rosario de La Frontera (Rosario de La Frontera, Salta) 25° 50' S 64° 56' W
328. Hoyo de Epuyén (Cushamén, Chubut) 42° 03' S 71° 31' W
329. Humaita (Capital, Salta) 24° 55' S 65° 23' W
330. Huyamampa (La Banda, Santiago del Estero) 27° 23' S 64° 18' W
331. Icaño (Avellaneda, Santiago del Estero) 28° 40' S 62° 53' W
332. Iglesia (Burruyacú, Tucumán) 26° 30' S 64° 45' W
333. Iguazú (Iguazú, Misiones) 25° 35' S 54° 33' W
334. Iguazú, cerca de las Cataratas del Iguazú (Iguazú, Misiones) 25° 41' S 54° 27' W
335. Ingenio Amalia (Capital, Tucumán) 26° 52' S 65° 13' W
336. Ingenio Lules (Lules, Tucumán) 26° 55' S 65° 20' W
337. Ingenio San Martín del Tabacal (Orán, Salta) 23° 15' S 64° 15' W
338. Ingenio San Pablo (Lules, Tucumán) 26° 54' S 65° 19' W
339. Ingenio Santa Lucía (Monteros, Tucumán) 27° 06' S 65° 31' W
340. Instituto Lillo (Capital, Tucumán) 26° 49' S 65° 13' W
341. Instituto Lillo, San Miguel de Tucumán (Capital, Tucumán) 26° 49' S 65° 13' W
342. Ischigualasto (Valle Fertil, San Juan) 30° 06' S 67° 55' W
343. Isla Apipé (Ituzaingó, Corrientes) 27° 30' S 56° 53' W
344. Isla Apipé Grande (Ituzaingó, Corrientes) 27° 30' S 56° 53' W
345. Isla del Cerrito (Bermejo, Chaco) 27° 16' S 58° 41' W
346. Isla Victoria (Los Lagos, Neuquén) 41° 00' S 71°

30' W
347. Isla Victoria, Piedras Blancas (Los Lagos, Neuquén) 40° 50' S 71° 30' W
348. Islas del Ibicuy, Paranacito (Islas del Ibicuy, Entre Ríos) 33° 44' S 58° 40' W
349. Islas del Ibicuy (Islas del Ibicuy, Entre Ríos) 33° 44' S 59° 10' W
350. Itá Ibaté (General Paz, Corrientes) 27° 26' S 57° 20' W
351. Itatí (Itatí, Corrientes) 27° 16' S 58° 15' W
352. Itaú (Campo Largo), Sierras de Tartagal, 1600 m (San Martín, Salta) 22° 05' S 63° 55' W
353. Ituzaingó (Ituzaingó, Corrientes) 27° 35' S 56° 41' W
354. Ituzaingó, 25 km E (Ituzaingó, Corrientes) 27° 36' S 56° 25' W
355. Jct. Hwy 2 and Arroyo Paraíso (Guaraní, Misiones) 27° 11' S 54° 03' W
356. Jct. Hwy 21 and Arroyo Oveja Negra, approx. 2 km W Parque Provincial Moconá (Guaraní, Misiones) 27° 08' S 53° 54' W
357. Joaquín V. Gonzalez, 8 km SE, Finca San Javier (Anta, Salta) 25° 02' S 64° 05' W
358. Jujuy ciudad (Dr. Manuel Belgrano, Jujuy) 24° 12' S 65° 19' W
359. Junta de los Ríos Tarija y Bermejo (Orán, Salta) 22° 51' S 64° 20' W
360. Juntas de San Antonio (Orán, Salta) 22° 51' S 64° 20' W
361. La Argentina (Minas, Córdoba) 31° 14' S 65° 18' W
362. La Banda (La Banda, Santiago del Estero) 27° 42' S 64° 14' W
363. La Banderita (Andalgalá, Catamarca) 27° 19' S 65° 58' W
364. La Banderita, Ruta 62 camino a Las Estancias (Andalgalá, Catamarca) 27° 19' S 65° 58' W
365. La Bismutina (Minas, Córdoba) 31° 09' S 65° 13' W
366. La Caldera (La Caldera, Salta) 24° 37' S 65° 23' W
367. La Ciénaga, 2500 m (Tafí del Valle, Tucumán) 26° 46' S 65° 39' W
368. La Cumbre (Punilla, Córdoba) 30° 59' S 64° 30' W
369. La Fragua (Pellegrini, Santiago del Estero) 26° 08' S 64° 20' W
370. La Gallareta, Cerrito, km 60 (Vera, Santa Fe) 29° 30' S 60° 30' W
371. La Higuera (Cruz del Eje, Córdoba) 31° 01' S 65° 06' W
372. La Higuera (Trancas, Tucumán) 26° 23' S 65° 26' W
373. La Junta, 1600 m (Ambato, Catamarca) 28° 08' S 65° 54' W
374. La Maya, 45 km SE Bell Ville (Marcos Juárez, Córdoba) 33° 00' S 62° 28' W
375. La Merced (Paclín, Catamarca) 28° 10' S 65° 41' W
376. La Merced (Cerrillos, Salta) 24° 58' S 65° 29' W
377. La Merced, 1200 m (Cerrillos, Salta) 24° 58' S 65° 29' W
378. La Paz (San Javier, Córdoba) 32° 15' S 65° 01' W
379. La Pega (Guaymallén, Mendoza) 32° 49' S 68° 40' W
380. La Plata (La Plata, Buenos Aires) 34° 55' S 57° 57' W
381. La Población (Cruz del Eje, Córdoba) 30° 50' S 65° 21' W
382. La Pochita, Baritina (Sobremonte, Córdoba) 29° 46' S 64° 49' W
383. La Puerta (Ambato, Catamarca) 28° 10' S 65° 48' W
384. La Puerta (Río Hondo, Santiago del Estero) 27° 38' S 64° 35' W
385. La Rinconada (Yerba Buena, Tucumán) 26° 49' S 65° 20' W
386. La Rioja (Capital, La Rioja) 29° 25' S 66° 51' W
387. La Toma (Coronel Pringles, San Luis) 33° 04' S 65° 38' W
388. La Viña (La Viña, Salta) 25° 28' S 65° 35' W
389. La Viña, iglesia (La Viña, Salta) 25° 28' S 65° 35' W
390. Laferrere (La Matanza, Buenos Aires) 34° 45' S 58° 35' W
391. Lago Futalaufquén (Futaleufú, Chubut) 42° 53' S 71° 37' W
392. Lago Perito Moreno (Bariloche, Río Negro) 41° 08' S 71° 26' W
393. Laguna Blanca (Pilcomayo, Formosa) 25° 08' S 58° 15' W
394. Laguna Brava (Capital, Corrientes) 27° 30' S 58° 43' W
395. Laguna Chascomús (Chascomús, Buenos Aires) 35° 34' S 58° 02' W
396. Laguna Chasicó (Villarino, Buenos Aires) 38° 38' S 63° 06' W
397. Laguna Colorada Grande, Caleu Caleu (Caleu Caleu, La Pampa) 38° 20' S 63° 45' W
398. Laguna de las Catas (San Martín, Salta) 22° 16' S

63° 52' W
399. Laguna de los Panzones, Retiro (Rivadavia, Salta) 22° 54' S 63° 10' W
400. Laguna Galarza (Santo Tomé, Corrientes) 28° 06' S 56° 40' W
401. Laguna Grande (Corpen Aike, Santa Cruz) 49° 34' S 70° 14' W
402. Laguna La Brea (Santa Bárbara, Jujuy) 23° 56' S 64° 28' W
403. Laguna La Brea, 25 km W Palma Sola (Santa Bárbara, Jujuy) 23° 56' S 64° 28' W
404. Laguna Miranda, Zona Zapala (Zapala, Neuquén) 38° 54' S 70° 16' W
405. Laguna Paiva, B° Las Lomas (Capital, Corrientes) 27° 30' S 58° 45' W
406. Lanús (Lanús, Buenos Aires) 34° 42' S 58° 23' W
407. Las Chacras (Pocho, Córdoba) 31° 25' S 65° 00' W
408. Las Coloradas, 1000 m (Catan Lil, Neuquén) 39° 34' S 70° 36' W
409. Las Estancias (Andalgalá, Catamarca) 27° 28' S 66° 02' W
410. Las Estancias (Punilla, Córdoba) 30° 58' S 64° 40' W
411. Las Juntas, 22 km W Choromoro (Trancas, Tucumán) 26° 24' S 65° 31' W
412. Las Juntas, 22 km W Choromoro on Hwy 312, 3,500 ft. (Trancas, Tucumán) 26° 24' S 65° 31' W
413. Las Juntas, 50 km NW Catamarca Ciudad (Ambato, Catamarca) 28° 08' S 65° 54' W
414. Las Juntas, Estancia de los Figueroa, 50 km NW Catamarca Ciudad (Ambato, Catamarca) 28° 08' S 65° 54' W
415. Las Lajitas (Anta, Salta) 24° 41' S 64° 15' W
416. Las Lomitas (Patiño, Formosa) 24° 43' S 60° 36' W
417. Las Marías (Santo Tomé, Corrientes) 28° 01' S 56° 01' W
418. Las Mercedes (Pilcomayo, Formosa) 25° 11' S 57° 54' W
419. Las Mesadas (Trancas, Tucumán) 26° 27' S 65° 30' W
420. Las Pavas (Chicligasta, Tucumán) 27° 15' S 65° 52' W
421. Las Pavas, Aconquija (Chicligasta, Tucumán) 27° 15' S 65° 52' W
422. Las Talas, 4 km al N de Bella Vista (Leales, Tucumán) 27° 00' S 65° 17' W
423. Las Termas (Río Hondo, Santiago del Estero) 27° 30' S 64° 50' W
424. Las Tipas, Parque Biológico (Tafí Viejo, Tucumán) 26° 39' S 65° 21' W
425. Las Tumanas, along Hwy 510 at crossing of Río Tumanas (Valle Fertil, San Juan) 30° 52' S 67° 20' W
426. Las Tumanas, Río Tumanas (Valle Fertil, San Juan) 30° 52' S 67° 20' W
427. Lavalle (General Lavalle, Buenos Aires) 36° 30' S 57° 13' W
428. Lavalle (Lavalle, Mendoza) 32° 43' S 68° 36' W
429. Lavalle, Estancia El Salvador (Guasayán, Santiago del Estero) 28° 12' S 65° 07' W
430. Leandro N. Alem (Leandro N. Alem, Misiones) 27° 36' S 55° 19' W
431. Ledesma (Ledesma, Jujuy) 23° 50' S 64° 47' W
432. Leleque (Cushamén, Chubut) 42° 24' S 71° 04' W
433. Leocadio Paz (Trancas, Tucumán) 26° 08' S 65° 18' W
434. Libertad (Iguazú, Misiones) 25° 55' S 54° 36' W
435. Libertador General San Martín (Ledesma, Jujuy) 23° 49' S 64° 47' W
436. Libres del Sur (Chascomús, Buenos Aires) 35° 44' S 57° 43' W
437. Lobería, 15 km SW (Lobería, Buenos Aires) 38 12' S 58 44' W
438. Lobos (Lobos, Buenos Aires) 35° 12' S 59° 06' W
439. Longchamps (Almirante Brown, Buenos Aires) 34° 52' S 58° 24' W
440. Los Cisnes (Juárez Celman, Córdoba) 33° 24' S 63° 28' W
441. Los Helechos, Escuela n° 12 (Oberá, Misiones) 27° 33' S 55° 03' W
442. Los Hoyos (Sobremonte, Córdoba) 29° 48' S 64° 48' W
443. Los Madrejones, Junta de los Ríos Tarija e Itaú, 1400 m (San Martín, Salta) 22° 18' S 64° 09' W
444. Los Molles (Cruz del Eje, Córdoba) 30° 54' S 65° 15' W
445. Los Nacimientos, ruta 40, km 869 (Belén, Catamarca) 27° 07' S 66° 42' W
446. Los Parlamentos (San Rafael, Mendoza) 35° 02' S 69° 20' W
447. Los Perales, San Salvador de Jujuy (Dr. Manuel Belgrano, Jujuy) 24° 11' S 65° 19' W
448. Los Sarmientos (Río Chico, Tucumán) 27° 25' S 65° 42' W
449. Los Vásquez (Capital, Tucumán) 26° 50' S 65° 13' W
450. Los Vásquez, 445 m (Capital, Tucumán) 26° 50' S 65° 13' W

451. Los Yngleses, Ajó (General Lavalle, Buenos Aires) 36° 31' S 56° 53' W
452. Luan Toro, 25 km S (Toay, La Pampa) 36° 20' S 65° 07' W
453. Luján, Quines (Ayacucho, San Luis) 32° 22' S 65° 56' W
454. Lumbrera (Metán, Salta) 25° 10' S 64° 56' W
455. Maipú (Maipú, Buenos Aires) 36° 52' S 57° 54' W
456. Malabrigo (General Obligado, Santa Fe) 29° 20' S 59° 59' W
457. Malargue (Malargue, Mendoza) 35° 28' S 69° 35' W
458. Manantiales (Mburucuyá, Corrientes) 27° 56' S 58° 06' W
459. Manuel Elordi, Vermejo, 500 m (Orán, Salta) 23° 16' S 64° 09' W
460. Mar Argentino (40° 04.5' S 56° 21.5' W)
461. Mar del Plata (General Pueyrredón, Buenos Aires) 38° 00' S 57° 34' W
462. Mar del Plata, Campo de los Padres (General Pueyrredón, Buenos Aires) 38° 00' S 57° 34' W
463. Marcos Paz (Yerba Buena, Tucumán) 26° 49' S 65° 17' W
464. Martínez (San Isidro, Buenos Aires) 34° 30' S 58° 30' W
465. Mburucuyá (Mburucuyá, Corrientes) 28° 03' S 58° 13' W
466. Mendoza (Capital, Mendoza) 32° 54' S 68° 50' W
467. Mercedes (Mercedes, Corrientes) 29° 11' S 58° 04' W
468. Metán (Metán, Salta) 25° 30' S 64° 58' W
469. Metán, 850 m (Metán, Salta) 25° 30' S 64° 58' W
470. Mina Pablo, Unchimé, 25 km E General Güemes, 1100 m (General Güemes, Salta) 24° 40' S 64° 55' W
471. Mina San Ignacio (San Alberto, Córdoba) 31° 58' S 65° 33' W
472. Misión Nueva Pompeya (General Güemes, Chaco) 24° 50' S 61° 30' W
473. Mollecito, 30 km SE Andalgalá (Pomán, Catamarca) 27° 46' S 66° 12' W
474. Monte Bello (Río Chico, Tucumán) 27° 22' S 65° 45' W
475. Monte Bello, margen derecha del Río Medina (Río Chico, Tucumán) 27° 22' S 65° 45' W
476. Monteagudo (Simoca, Tucumán) 27° 31' S 65° 17' W
477. Montecarlo (Montecarlo, Misiones) 26° 33' S 54° 47' W
478. Moreno (Moreno, Buenos Aires) 34° 39' S 58° 47' W
479. Muñecas (Capital, Tucumán) 26° 47' S 65° 15' W
480. Ñacuñán (Santa Rosa, Mendoza) 34° 03' S 67° 58' W
481. Naschel (Chacabuco, San Luis) 32° 56' S 65° 28' W
482. Neuquén (Confluencia, Neuquén) 38° 58' S 68° 03' W
483. Neuquén, 400 m (Confluencia, Neuquén) 38° 58' S 68° 03' W
484. Niño Dios, más o menos 1900 m (Minas, Córdoba) 31° 05' S 65° 18' W
485. Noetinger, E Córdoba, 100 m (Unión, Córdoba) 32° 22' S 62° 19' W
486. Ñorco, 1200 m (Trancas, Tucumán) 26° 29' S 65° 22' W
487. Ñorco, Vipos, 2500 m (Trancas, Tucumán) 26° 29' S 65° 22' W
488. Nueva Esperanza (Pellegrini, Santiago del Estero) 26° 12' S 64° 16' W
489. Oberá (Oberá, Misiones) 27° 29' S 55° 07' W
490. Ojo de Agua (Minas, Córdoba) 31° 14' S 65° 12' W
491. Ojo de Agua (Ojo de Agua, Santiago del Estero) 29° 28' S 63° 39' W
492. Olegario V. Andrade (Candelaria, Misiones) 27° 34' S 55° 30' W
493. On Highway 9 at border with Salta, at campground on the way to El Carmen (El Carmen, Jujuy) 24° 28' S 65° 21' W
494. Orán (Orán, Salta) 23° 08' S 64° 20' W
495. Orán, 15 km S, 15 km W along Río Santa María (Orán, Salta) 23° 19' S 64° 14' W
496. Orán, 20 km al NW (Orán, Salta) 23° 00' S 64° 22' W
497. Orán, 20 km al NW de Agua Blanca (Orán, Salta) 22° 33' S 64° 32' W
498. Palma Sola (Santa Bárbara, Jujuy) 24° 00' S 64° 19' W
499. Palma Sola, 550 m (Santa Bárbara, Jujuy) 24° 00' S 64° 19' W
500. Palma Sola, Mina de Azufre (Santa Bárbara, Jujuy) 24° 00' S 64° 19' W
501. Pampa Llajta (Atamisqui, Santiago del Estero) 28° 30' S 63° 50' W
502. Parada Leis (Capital, Misiones) 27° 36' S 55° 50' W
503. Paraje Paraíso, 16 km SE, sobre ruta 21 (Guaraní, Misiones) 26° 58' S 54° 10' W

504. Paraná de Las Palmas y Canal 6 (Campana, Buenos Aires) 34° 07' S 59° 02' W
505. Parque 9 de Julio, Tucumán (Capital, Tucumán) 26° 47' S 65° 15' W
506. Parque Nacional Baritú, Finca Jakulica, Angosto del Río Pescado, 650 m (Santa Victoria, Salta) 22° 33' S 64° 32' W
507. Parque Nacional Baritú, Finca Lipeo, a 15 km de Las Juntas, 600 m (Santa Victoria, Salta) 22° 27' S 64° 46' W
508. Parque Nacional Baritú, Las Juntas de Río Lipeo y Bermejo (Santa Victoria, Salta) 22° 26' S 64° 32' W
509. Parque Nacional Baritú, naciente Arroyo Santelmita, 900 m (Santa Victoria, Salta) 22° 31' S 64° 34' W
510. Parque Nacional El Palmar (Colón, Entre Ríos) 31° 59' S 58° 18' W
511. Parque Nacional El Rey (Anta, Salta) 24° 42' S 64° 38' W
512. Parque Nacional El Rey, Arroyo de Los Puestos (Anta, Salta) 24° 42' S 64° 38' W
513. Parque Nacional Iguazú (Iguazú, Misiones) 25° 41' S 54° 27' W
514. Parque Nacional Iguazú, cataratas (Iguazú, Misiones) 25° 41' S 54° 27' W
515. Parque Nacional Iguazú, ex aeropuerto (Iguazú, Misiones) 25° 41' S 54° 27' W
516. Parque Nacional Iguazú, palmital en ruta 107 (Iguazú, Misiones) 25° 41' S 54° 27' W
517. Parque Nacional Río Pilcomayo (Pilcomayo, Formosa) 25° 00' S 58° 15' W
518. Parque Provincial El Cochuna, km 40 sobre ruta 47 (Chicligasta, Tucumán) 27° 18' S 65° 54' W
519. Paso de la Cruz (Anta, Salta) 24° 55' S 64° 30' W
520. Paso del Rey, 1 km N, along Arroyo de la Cañada Honda (Coronel Pringles, San Luis) 32° 52' S 66° 00' W
521. Paso del Rey, 9 km N (Coronel Pringles, San Luis) 32° 50' S 66° 00' W
522. Paso Flores (Pilcaniyeu, Río Negro) 40° 35' S 70° 48' W
523. Paso Quintana, Rosario de La Frontera (Rosario de La Frontera, Salta) 25° 48' S 64° 58' W
524. Patiño (Patiño, Formosa) 24° 30' S 59° 30' W
525. Patquía (Independencia, La Rioja) 30° 09' S 66° 57' W
526. Pedernal (Sarmiento, San Juan) 31° 59' S 68° 44' W
527. Perico (El Carmen, Jujuy) 24° 23' S 65° 07' W
528. Picada Vieja (Oberá, Misiones) 27° 29' S 55° 07' W
529. Pico Salamanca (Escalante, Chubut) 45° 25' S 67° 25' W
530. Piedra Tendida, 12 km WNW Burruyacú along Río Cajón, 2,500 ft. (Burruyacú, Tucumán) 26° 30' S 64° 52' W
531. Piedra Tendida, 5 km W de Dique El Cajón (Burruyacú, Tucumán) 26° 30' S 64° 52' W
532. Piedrabuena (Burruyacú, Tucumán) 26° 44' S 64° 40' W
533. Pilcomayo (Pilcomayo, Formosa) 25° 22' S 57° 39' W
534. Pinar Velardez, 1560 m (Tafí Viejo, Tucumán) 26° 43' S 65° 22' W
535. Piquete (La Capital, Santa Fe) 31° 34' S 60° 43' W
536. Piquirenda Viejo, 30 km N Tartagal (San Martín, Salta) 22° 21' S 63° 50' W
537. Piquirenda Viejo, 6 km W (San Martín, Salta) 22° 21' S 63° 50' W
538. Piquirenda Viejo, 8 km W (San Martín, Salta) 22° 21' S 63° 50' W
539. Planta Caimancito, Parque Nacional Calilegua (Ledesma, Jujuy) 23° 44' S 64° 36' W
540. Plátanos (Berazategui, Buenos Aires) 34° 47' S 58° 10' W
541. Playa Larga, Río Los Sosa, Ruta 307 km 19.7 (Monteros, Tucumán) 27° 03' S 65° 40' W
542. Pomán, 95 km S Andalgalá near balneario, 4,400 ft. (Pomán, Catamarca) 28° 24' S 66° 13' W
543. Posadas (Capital, Misiones) 27° 22' S 55° 53' W
544. Posadas, 61 km W, along Hwy 12 (Ituzaingó, Corrientes) 27° 37' S 56° 28' W
545. Potrero Dike, 13 km N Andalgalá (Andalgalá, Catamarca) 27° 32' S 66° 20' W
546. Potrero River Dike, El Potrero (Andalgalá, Catamarca) 27° 32' S 66° 20' W
547. Potrero River Dike, Potrero, Approx. 13 km N Andalgalá (Andalgalá, Catamarca) 27° 32' S 66° 20' W
548. Pozo del Gato (General Güemes, Chaco) 24° 40' S 61° 58' W
549. Pozo del Gato, 3 km E Punta del Agua (General Güemes, Chaco) 24° 40' S 61° 58' W
550. Pozo del Tigre (Patiño, Formosa) 24° 54' S 60° 19' W
551. Pozo Hondo (Jiménez, Santiago del Estero) 27° 10' S 64° 30' W
552. Pozo Hondo, Estancia El Guapo (Jiménez,

Santiago del Estero) 27° 10' S 64° 30' W
553. Primero de Mayo (Uruguay, Entre Ríos) 32° 15' S 58° 25' W
554. Profundidad (Candelaria, Misiones) 27° 35' S 55° 47' W
555. Pronunciamiento (Uruguay, Entre Ríos) 32° 21' S 58° 26' W
556. Provincia de Formosa, 24° 56' 59° 12' (Patiño, Formosa) 24° 56' S 59° 12' W
557. Puente sobre el Río Bermejo (San Martín, Chaco) 26° 20' S 59° 22' W
558. Puerto Aguirre (=Puerto Iguazú) (Iguazú, Misiones) 25° 35' S 54° 33' W
559. Puerto Bermejo (Bermejo, Chaco) 26° 56' S 58° 30' W
560. Puerto Pilcomayo (Pilcomayo, Formosa) 25° 22' S 57° 39' W
561. Puerto Piray, Ruta 12 (Montecarlo, Misiones) 26° 28' S 54° 43' W
562. Puerto Rico (Libertador General San Martín, Misiones) 26° 48' S 55° 02' W
563. Puerto Santa Fe (La Capital, Santa Fe) 31° 40' S 60° 40' W
564. Puerto Vélaz (Laishí, Formosa) 26° 40' S 58° 32' W
565. Puesto Arroyo Cabeza de Vaca, 30 km N Apolinario Saravia (Orán, Salta) 23° 55' S 64° 02' W
566. Puesto Cortaderas (Burruyacú, Tucumán) 26° 18' S 64° 37' W
567. Puesto Divisadero, 35 km S, 5 km E Ing. Guillermo N. Juárez (Matacos, Formosa) 24° 14' S 61° 56' W
568. Puesto Fronterizo 6 km W La Banderita (Andalgalá, Catamarca) 27° 19' S 65° 58' W
569. Puesto Viejo, 16 km N Güemes, Río Las Pavas (El Carmen, Jujuy) 24° 30' S 65° 08' W
570. Punilla, Valle Hermoso (Punilla, Córdoba) 31° 08' S 64° 30' W
571. Punta Lara (Ensenada, Buenos Aires) 34° 49' S 57° 59' W
572. Punta Loyola, S. Patagonia (Güer Aike, Santa Cruz) 51° 37' S 69° 01' W
573. Punta Rasa, Cabo San Antonio (General Lavalle, Buenos Aires) 36° 23' S 56° 43' W
574. Quebrada de Acambuco, 5 km W Dique Itiyuro (San Martín, Salta) 22° 10' S 63° 53' W
575. Quebrada de López, San Francisco del Monte de Oro (Ayacucho, San Luis) 32° 40' S 66° 07' W
576. Quebrada de Lules, 11 km SW San Pablo (Lules, Tucumán) 26° 56' S 65° 21' W
577. Quebrada del Arroyo Astica, 8 km W Astica (Valle Fertil, San Juan) 30° 54' S 67° 17' W
578. Quebrada del Toro (Trancas, Tucumán) 26° 18' S 65° 41' W
579. Quequén (Necochea, Buenos Aires) 38° 32' S 58° 42' W
580. Rancho Los Yngleses, Ajó (General Lavalle, Buenos Aires) 36° 31' S 56° 53' W
581. Rayo Cortado-Cerro Colorado (Río Seco, Córdoba) 30° 04' S 63° 50' W
582. Reconquista (General Obligado, Santa Fe) 29° 10' S 59° 50' W
583. Reserva Ecológica Ñacuñán (Santa Rosa, Mendoza) 34° 03' S 67° 58' W
584. Reserva Provincial "Aguas Chiquitas" El Cadillal (Burruyacú, Tucumán) 26° 37' S 65° 12' W
585. Reserva Provincial Santa Ana, Remanso del Gallego (Río Chico, Tucumán) 27° 26' S 65° 46' W
586. Reserva Telteca (Lavalle, Mendoza) 32° 20' S 67° 45' W
587. Resistencia (San Fernando, Chaco) 27° 27' S 59° 00' W
588. Resistencia, 20 km N (Primero de Mayo, Chaco) 27° 16' S 58° 58' W
589. Resistencia, márgenes del Río Paraná (San Fernando, Chaco) 27° 27' S 58° 57' W
590. Rincón de Luna (Concepción, Corrientes) 28° 38' S 58° 10' W
591. Rincón de Papagayos, 2 km E Papagayos (Chacabuco, San Luis) 32° 40' S 64° 57' W
592. Río Bermejo, 10 mi S Colonia km 503 (Patiño, Formosa) 25° 26' S 60° 15' W
593. Río Blanco, 35 km SW Salta (Rosario de Lerma, Salta) 24° 59' S 65° 35' W
594. Río Carabelas (Campana, Buenos Aires) 34° 07' S 59° 02' W
595. Río Ceballos (Colón, Córdoba) 31° 11' S 64° 20' W
596. Río Cuarto (Río Cuarto, Córdoba) 33° 08' S 64° 18' W
597. Río de Oro, General Vedia (Bermejo, Chaco) 26° 56' S 58° 41' W
598. Río de Zora y cruce con ruta 34 (Ledesma, Jujuy) 23° 44' S 64° 40' W
599. Río del Valle (Anta, Salta) 24° 38' S 64° 16' W
600. Río Dulce, 5 km E Las Termas, camino a Vinará (Río Hondo, Santiago del Estero) 27° 30' S 64° 46' W
601. Río El Naranjo, 14 km W de Ruta provincial 5

(Anta, Salta) 24° 58' S 64° 38' W
602. Río Guanaco, 32 km al NE de Lumbrera (Anta, Salta) 24° 50' S 64° 40' W
603. Río Guaycurú (Primero de Mayo, Chaco) 27° 10' S 58° 50' W
604. Río Hondo (San Alberto, Córdoba) 31° 48' S 65° 29' W
605. Río Las Piedras, Parque Biológico Sierra de San Javier (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
606. Río Lavayén, N de Santa Clara, sobre ruta 6 (San Pedro, Jujuy) 24° 10' S 64° 45' W
607. Río Ledesma, 14 km S Pueblo Ledesma (Ledesma, Jujuy) 23° 50' S 64° 47' W
608. Río Loro (Burruyacú, Tucumán) 26° 37' S 65° 10' W
609. Río Los Sosa, Ruta 307, km 19.7, camino a Tafí del Valle, 700 m (Monteros, Tucumán) 27° 05' S 65° 40' W
610. Río Los Sosa, Ruta 307, km 19.7, camino a Tafí del Valle, 750 m (Monteros, Tucumán) 27° 05' S 65° 40' W
611. Río Los Sosa, Ruta 307, km 23.9, camino a Tafí del Valle, 850 m (Monteros, Tucumán) 27° 04' S 65° 40' W
612. Río Los Sosa, Ruta 307, km 24 (Monteros, Tucumán) 27° 04' S 65° 40' W
613. Río Los Sosa, Ruta 307, km 24.9, camino a Tafí del Valle, 850 m (Monteros, Tucumán) 27° 04' S 65° 40' W
614. Río Mojotoro, 5 km N Salta (Capital, Salta) 24° 33' S 65° 17' W
615. Río Mojotoro, Puente del F.C. Belgrano (General Güemes, Salta) 24° 31' S 65° 02' W
616. Río Paraguay, Bouvier (Pilcomayo, Formosa) 25° 27' S 57° 35' W
617. Río Pescado (Orán, Salta) 22° 53' S 64° 27' W
618. Río Piedras, 600 m (Metán, Salta) 25° 18' S 64° 55' W
619. Río Porteño, 5 km S Estancia Santa Catalina (Patiño, Formosa) 24° 56' S 59° 12' W
620. Río Potrero, 13 km N Andalgalá (Andalgalá, Catamarca) 27° 32' S 66° 20' W
621. Río Pueblo Viejo, Reserva Provincial La Florida (Monteros, Tucumán) 27° 13' S 65° 37' W
622. Río Quinto (Coronel Pringles, San Luis) 33° 12' S 65° 51' W
623. Río Salí (Capital, Tucumán) 26° 50' S 65° 12' W
624. Río San Pablo, 3 km NW Concepción (Capayán, Catamarca) 28° 42' S 66° 04' W
625. Río Teuco, 10 km W Tartagal (General Güemes, Chaco) 24° 20' S 62° 00' W
626. Río Victoria (Guaraní, Misiones) 26° 58' S 54° 30' W
627. Romang, Isla El Laurel (San Javier, Santa Fe) 29° 30' S 59° 46' W
628. Rosario de La Frontera (Rosario de La Frontera, Salta) 25° 45' S 64° 57' W
629. Rosario de Lerma, Escuela Gurruchaga (Rosario de Lerma, Salta) 24° 59' S 65° 35' W
630. Ruta 2 y puente del Canal 2 (General Guido, Buenos Aires) 36° 47' S 57° 49' W
631. Ruta 307, 6 km S cruce con ruta a El Mollar (Monteros, Tucumán) 26° 53' S 65° 41' W
632. Ruta 307, km 43, 1700 m (Monteros, Tucumán) 26° 53' S 65° 41' W
633. Ruta 307, km 46, 1700 m (Monteros, Tucumán) 26° 53' S 65° 41' W
634. Saenz Peña (Comandante Fernández, Chaco) 26° 47' S 60° 27' W
635. Saladillo (Coronel Pringles, San Luis) 33° 12' S 65° 51' W
636. Saladillo, Río Quinto (Coronel Pringles, San Luis) 33° 12' S 65° 51' W
637. Salta (Capital, Salta) 24° 47' S 65° 24' W
638. Salta Capital (Capital, Salta) 24° 47' S 65° 24' W
639. Salta, 30 km NE (La Caldera, Salta) 24° 30' S 65° 22' W
640. Salta, casa habitada (Capital, Salta) 24° 47' S 65° 24' W
641. Salta, ciudad (Capital, Salta) 24° 47' S 65° 24' W
642. Salta, Parque San Martín (Capital, Salta) 24° 47' S 65° 24' W
643. San Agustín (Cerrillos, Salta) 24° 59' S 65° 25' W
644. San Antonio (Candelaria, Salta) 25° 55' S 65° 35' W
645. San Antonio (Jiménez, Santiago del Estero) 26° 46' S 64° 36' W
646. San Antonio de La Falda (Fray Mamerto Esquiú, Catamarca) 28° 26' S 65° 43' W
647. San Blas de los Sauces, 4 km SE San Blas (San Blas de los Sauces, La Rioja) 28° 26' S 67° 05' W
648. San Borgita (Ituzaingó, Corrientes) 27° 29' S 56° 07' W
649. San Borgita, Estero de Iberá (Ituzaingó, Corrientes) 27° 29' S 56° 07' W
650. San Carlos (Ituzaingó, Corrientes) 27° 45' S 55° 54' W
651. San Carlos de Bariloche, 4 km SW (Bariloche,

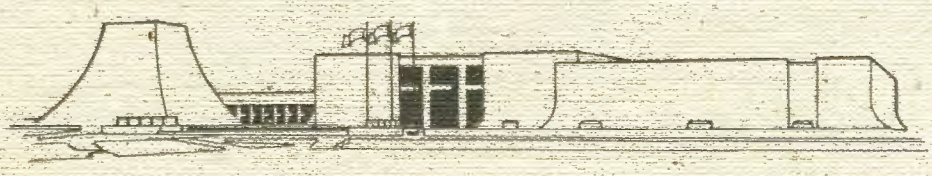
Río Negro) 41° 08' S 71° 17' W
652. San Esteban, 1100 m (Punilla, Córdoba) 30° 55' S 64° 32' W
653. San Felix (Alberdi, Santiago del Estero) 26° 38' S 63° 24' W
654. San Fernando (San Fernando, Buenos Aires) 34° 27' S 58° 34' W
655. San Francisco del Monte de Oro, 7 km E from downtown (Ayacucho, San Luis) 32° 36' S 66° 07' W
656. San Ignacio (San Ignacio, Misiones) 27° 17' S 55° 32' W
657. San Isidro (San Isidro, Buenos Aires) 34° 29' S 58° 31' W
658. San Isidro (Rosario V. Peñaloza, La Rioja) 31° 46' S 66° 25' W
659. San Javier (San Javier, Santa Fe) 30° 31' S 59° 58' W
660. San Javier (Tafí Viejo, Tucumán) 26° 48' S 65° 23' W
661. San Juan (San Alberto, Córdoba) 31° 37' S 65° 22' W
662. San Julián (Magallanes, Santa Cruz) 49° 19' S 67° 42' W
663. San Lorenzo (Ledesma, Jujuy) 23° 33' S 64° 40' W
664. San Lorenzo (Capital, Salta) 24° 44' S 65° 30' W
665. San Lorenzo (San Lorenzo, Santa Fe) 32° 45' S 60° 44' W
666. San Luis (Capital, San Luis) 33° 18' S 66° 22' W
667. San Martín (San Martín, San Luis) 32° 28' S 65° 40' W
668. San Martín de los Andes, 71 km SE (Lácar, Neuquén) 40° 10' S 71° 21' W
669. San Miguel (General Sarmiento, Buenos Aires) 34° 34' S 58° 42' W
670. San Miguel de Tucumán (Capital, Tucumán) 26° 50' S 65° 13' W
671. San Miguel de Tucumán, 28 km NE (Capital, Tucumán) 26° 37' S 65° 07' W
672. San Miguel de Tucumán, 29 km NE (Capital, Tucumán) 26° 37' S 65° 07' W
673. San Miguel de Tucumán, 450 m (Capital, Tucumán) 26° 50' S 65° 13' W
674. San Miguel de Tucumán, 456 m (Capital, Tucumán) 26° 50' S 65° 13' W
675. San Miguel de Tucumán, Plaza Independencia (Capital, Tucumán) 26° 49' S 65° 13' W
676. San Pedro (Jiménez, Santiago del Estero) 27° 06' S 64° 17' W
677. San Pedro de Colalao (Trancas, Tucumán) 26° 14' S 65° 29' W
678. San Pedro de Colalao, south of, at km marker 42, on Hwy 364, 4,700 ft (Trancas, Tucumán) 26° 20' S 65° 33' W
679. San Pedro de Guasayán (Guasayán, Santiago del Estero) 27° 57' S 65° 10' W
680. San Pedro, 20 km al SE (San Pedro, Misiones) 26° 47' S 53° 58' W
681. San Pedro, 26 km NE, sobre ruta 16 (Montecarlo, Misiones) 26° 34' S 53° 56' W
682. San Pedro, 47 km SE (San Pedro, Misiones) 26° 50' S 53° 48' W
683. San Pedro, vuelta de Rocha (San Pedro, Buenos Aires) 33° 39' S 59° 50' W
684. San Ramón de la Nueva Orán (Orán, Salta) 23° 08' S 64° 20' W
685. San Salvador de Jujuy (Dr. Manuel Belgrano, Jujuy) 24° 12' S 65° 19' W
686. San Salvador de Jujuy, 20 km W (Dr. Manuel Belgrano, Jujuy) 24° 10' S 65° 20' W
687. Santa Ana (Candelaria, Misiones) 27° 22' S 55° 35' W
688. Santa Bárbara (Valle Grande, Jujuy) 23° 36' S 65° 04' W
689. Santa Catalina, 5 km W (Guasayán, Santiago del Estero) 28° 08' S 64° 47' W
690. Santa Clara (Santa Bárbara, Jujuy) 24° 18' S 64° 41' W
691. Santa Fe (La Capital, Santa Fe) 31° 39' S 60° 43' W
692. Santa Fe, Ciudad (La Capital, Santa Fe) 31° 39' S 60° 43' W
693. Santa Inés (Capital, Misiones) 27° 31' S 55° 50' W
694. Santa Isabel (Pellegrini, Santiago del Estero) 26° 20' S 64° 20' W
695. Santa María, sobre Río Santa María (Orán, Salta) 23° 17' S 64° 14' W
696. Santa Rosa (Rivadavia, Salta) 24° 10' S 63° 08' W
697. Santa Victoria Este (Rivadavia, Salta) 22° 17' S 62° 43' W
698. Santa Victoria Oeste, 2200 m (Santa Victoria, Salta) 22° 15' S 64° 58' W
699. Santo Domingo (Pellegrini, Santiago del Estero) 26° 12' S 63° 46' W
700. Sauce Viejo (La Capital, Santa Fe) 31° 50' S 60° 52' W
701. Sauce Viejo, 17 km al N, cruce del Arroyo Negro con Río Santa Fe (La Capital, Santa Fe) 31°

47' S 60° 52' W
702. Sauce Viejo, Río Coronda (La Capital, Santa Fe) 31° 46' S 60° 51' W
703. Seclantás (Molinos, Salta) 25° 18' S 66° 15' W
704. Segunda Usina (Calamuchita, Córdoba) 32° 13' S 64° 31' W
705. Senda del Cedro Grande, Horco Molle (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
706. Senda del Pluviómetro, 800 m, Horco Molle (Yerba Buena, Tucumán) 26° 47' S 65° 23' W
707. Serranía de Las Pavas (Orán, Salta) 22° 33' S 64° 32' W
708. Sierra de la Ventana (Torquinst, Buenos Aires) 38° 08' S 61° 47' W
709. Simbolar (Pellegrini, Santiago del Estero) 26° 10' S 63° 45' W
710. Sumampa (Quebrachos, Santiago del Estero) 29° 22' S 63° 27' W
711. Tabacal (Orán, Salta) 23° 15' S 64° 15' W
712. Tacanas (Trancas, Tucumán) 26° 18' S 65° 30' W
713. Tacañitas (Taboada, Santiago del Estero) 28° 40' S 62° 35' W
714. Taco Pozo, 77 km NE, sobre picada 20 (Almirante Brown, Chaco) 25° 38' S 63° 15' W
715. Taco Yana (Trancas, Tucumán) 26° 11' S 65° 30' W
716. Tacuaruzú (Leandro N. Alem, Misiones) 27° 37' S 55° 39' W
717. Tafí de Valle, 2200 m (Tafí del Valle, Tucumán) 26° 52' S 65° 41' W
718. Tafí del Valle (Tafí del Valle, Tucumán) 26° 52' S 65° 41' W
719. Tafí Viejo (Tafí Viejo, Tucumán) 26° 44' S 65° 16' W
720. Tala Cañada, 1250 m (Pocho, Córdoba) 31° 21' S 64° 58' W
721. Tandil (Tandil, Buenos Aires) 37° 20' S 59° 08' W
722. Tapia (Trancas, Tucumán) 26° 36' S 65° 18' W
723. Tapso (Andalgalá, Catamarca) 27° 32' S 66° 20' W
724. Tartagal (General Güemes, Chaco) 24° 11' S 62° 07' W
725. Tartagal (San Martín, Salta) 22° 32' S 63° 49' W
726. Tartagal, 10 km al W (General Güemes, Chaco) 24° 20' S 62° 00' W
727. Tecka, 3 km N, along Hwy 40 (Languiñeo, Chubut) 43° 27' S 70° 48' W
728. Termas de Rosario de La Frontera (Rosario de La Frontera, Salta) 22° 50' S 64° 56' W
729. Teyú Cuaré (San Ignacio, Misiones) 27° 05' S 55° 23' W
730. Ticucho, 3 km E (Trancas, Tucumán) 26° 31' S 65° 14' W
731. Ticucho, entrando por cola del Dique El Cadillal (Trancas, Tucumán) 26° 31' S 65° 14' W
732. Tigre (Tigre, Buenos Aires) 34° 25' S 58° 35' W
733. Timbó Nuevo (Burruyacú, Tucumán) 26° 42' S 65° 07' W
734. Tinogasta (Tinogasta, Catamarca) 28° 04' S 67° 34' W
735. Toma de Los Laureles, 6 km SSW Chicoana, 1400 m (Chicoana, Salta) 24° 57' S 65° 37' W
736. Tonono, 1 km E sobre Río Itiyuro (San Martín, Salta) 22° 34' S 63° 29' W
737. Totoras (Iriondo, Santa Fe) 32° 35' S 61° 11' W
738. Trancas (Trancas, Tucumán) 26° 13' S 65° 17' W
739. Tranquitas (Burruyacú, Tucumán) 26° 37' S 65° 02' W
740. Tres Cruces, 8 km al SE, 3600 m (Humahuaca, Jujuy) 22° 59' S 65° 29' W
741. Tres Cruces, 8 km S, sobre Ruta 9 (Humahuaca, Jujuy) 22° 59' S 65° 29' W
742. Tucumán (Capital, Tucumán) 26° 50' S 65° 13' W
743. Tucumán, 370 m (Capital, Tucumán) 26° 50' S 65° 13' W
744. Tucumán, 400 m (Capital, Tucumán) 26° 50' S 65° 13' W
745. Tucumán, 450 m (Capital, Tucumán) 26° 50' S 65° 13' W
746. Tucumán, 456 m (Capital, Tucumán) 26° 50' S 65° 13' W
747. Tucumán, ciudad (Capital, Tucumán) 26° 50' S 65° 13' W
748. Tucumán, Ciudad, casa céntrica (Capital, Tucumán) 26° 50' S 65° 13' W
749. Tucumán, Hotel Savoy (Capital, Tucumán) 26° 50' S 65° 13' W
750. Unchimé (General Güemes, Salta) 24° 40' S 64° 55' W
751. Unquillo (Colón, Córdoba) 31° 14' S 64° 19' W
752. Upper Cachi (Cachi , Salta) 25° 07' S 66° 12' W
753. Uspallata (Las Heras, Mendoza) 32° 35' S 69° 22' W
754. Vado de Arrazayal (Orán, Salta) 22° 33' S 64° 32' W
755. Vado de Arrazayal, 20 km NW Aguas Blancas (Orán, Salta) 22° 33' S 64° 32' W
756. Venado Tuerto (General López, Santa Fe) 33° 46' S 61° 58' W
757. Villa Dolores (San Javier, Córdoba) 31° 57' S 65°

12' W
758. Villa El Potrero (Andalgalá, Catamarca) 27° 32' S 66° 20' W
759. Villa El Potrero (N Andalgalá), El Potrero (Andalgalá, Catamarca) 27° 32' S 66° 20' W
760. Villa Gesell (General Madariaga, Buenos Aires) 37° 15' S 56° 57' W
761. Villa La Angostura, 19 km N (Los Lagos, Neuquén) 40° 40' S 71° 40' W
762. Villa La Ventana (Torquinst, Buenos Aires) 38° 08' S 61° 47' W
763. Villa Lanús (Capital, Misiones) 27° 26' S 55° 53' W
764. Villa Larca (Chacabuco, San Luis) 32° 38' S 65° 00' W
765. Villa María (Colón, Córdoba) 31° 30' S 64° 00' W
766. Villa Mercedes (Pellegrini, Santiago del Estero) 26° 29' S 64° 12' W
767. Villa Miguel Lanús (Capital, Misiones) 27° 26' S 55° 53' W
768. Villa Unión (Coronel F. Varela, La Rioja) 29° 18' S 68° 12' W
769. Villa Unión (Mitre, Santiago del Estero) 29° 27' S 62° 50' W
770. Vinalito, 2 km al NW, al borde del segundo canal (Santa Bárbara, Jujuy) 23° 40' S 64° 25' W
771. Vipos, Estancia San Pedro (Trancas, Tucumán) 26° 29' S 65° 22' W
772. Virasoro (Santo Tomé, Corrientes) 28° 02' S 56° 01' W
773. Virgen del Valle picnic area on Highway 64 between Santa Catalina and La Puerta Chiquita (Guasayán, Santiago del Estero) 28° 09' S 64° 50' W
774. Yacanto (San Javier, Córdoba) 32° 03' S 65° 02' W
775. Yerba Buena (Yerba Buena, Tucumán) 26° 49' S 65° 19' W
776. Yuto (Ledesma, Jujuy) 23° 38' S 64° 28' W
777. Yuto, Río San Francisco, altura de Estación (Ledesma, Jujuy) 23° 38' S 64° 28' W
778. Zanjón Bermejo (Capital, Mendoza) 32° 54' S 68° 50' W
779. Zelaya (Pilar, Buenos Aires) 34° 22' S 58° 53' W

NOT LOCATED

Abra de La Punilla (Anta,
Aguaray, 120 km E (Rivadavia, Salta)
Antilla (Pellegrini, Santiago del Estero)
Apipé Grande (Chaco)
Arroyo Urugua-í (Misiones)
Arroyo Urugua-í, km 10 (Misiones)
Buena Vista (Capital, Salta)
Chacra La Merced (Capital, Córdoba)
Chubut (Chubut)
Delta del Paraná (Buenos Aires)
Delta del Paraná de las Palmas (Campana, Buenos Aires)
Delta, Brazo Largo (Islas del Ibicuy, Entre Ríos)
Departamento Belén (Catamarca)
Departamento Cainguás (Misiones)
Departamento Candelaria (Misiones)
Departamento Capital (Misiones)
Departamento General Roca (actual Dep. R. V. Peñaloza, La Rioja)
Departamento Gualeyguachú (Entre Ríos)
Departamento Guaraní (Misiones)
Departamento Oberá (Misiones)
Departamento San Carlos (Mendoza)
Departamento San Carlos (Salta)
El Zanjón (Santiago del Estero)
Ensenadita (San Cosme, Corrientes)
Escuela 633, km 11 (Oberá, Misiones)
Estancia Chacabuco, 18 km NE (Confluencia, Neuquén)
Estancia El Cóndor, 22 km ESE Bariloche (Río Negro)
Estancia El Pilar, 2 km de parada Tataré (Mercedes, Corrientes)
Estancia La Palmita (Ituzaingó, Corrientes)
Estancia Las Mercedes (Anta, Salta)
Estancia San Jorge (Iguazú, Misiones)
Estero de los Patos (Patiño, Formosa)
Finca El Palmar (Jujuy)
Golfo San José (Biedma, Chubut)
Golfo San Matías (Río Negro)
Isla Ella (Buenos Aires)
Islas Malvinas (Islas Malvinas)
La Libertad (Jiménez, Santiago del Estero)
La Pampa (La Pampa)
Las Talitas (Monteros, Tucumán)
Los Cisnes, Delta del Paraná (Buenos Aires)
Mbariguí (Berón de Astrada, Corrientes)
Misiones (Misiones)
Misiones, 200 m (Misiones)
Noreste de Corrientes (Corrientes)
Northern Chaco (Chaco)
Palo Seco (Tulumba Córdoba)
Paraná de Las Palmas (Campana Buenos Aires)
Paso del Durazno (Río Cuarto Córdoba)
Patagonia

Península de Valdés (Biedma Chubut)
Provincia de Chaco (Chaco)
Provincia de Formosa (Formosa)
Puerto Pratt, Last Hope Inlet, Patagonia, 5 m
Puerto San Martín (San Lorenzo Santa Fe)
Puesto Lima (Mendoza)
Río de La Plata mouth, 30 or 40 mi S, Patagonian coast (Buenos Aires)
Río Hondo (Cruz del Eje Córdoba)
Río Negro (Río Negro)
San Isidro (Tulumba Córdoba)
San Salvador (Figueroa Santiago del Estero)
Sarapampa (Pellegrini Santiago del Estero)
Sierra de Ancasti, Ruta 2, 1700 m (Catamarca)
Tafí, 2000 m (Tucumán)
Tucumán, 1500 m (Tucumán)
Tucumán, no specific locality (Tucumán)
Valle de Lerma, 1200 m (Rosario de Lerma Salta)
Villa Guillermina (Chaco)
Villa Walcarde (Córdoba) 394 394

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